

Forecasting Business Conditions

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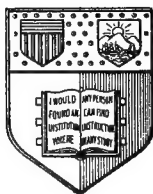
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Forecasting business conditions,



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EXERCISES and Test Questions

The Exercises, which are *starred*, cannot be answered directly from the Text but call for independent thought and judgment. They develop the ability to put what one knows into use. You will find solutions for them inside the folded page, which should be consulted *after* you have jotted down your own solutions.

The Test Questions, which are *not* starred, can be answered directly from the Text. Refer to the Text, if you need to, in answering them.

Ch. I. Foresight Ch. II. Measuring Business Conditions

*1. A farmer living at Culbertson, Nebr., a typical small country town, not long ago laid the following situation before Deere & Co., who in turn submitted it to the National City Bank of New York.

Number of Bushels of Corn

required to buy a farm wagon, a grain binder, a corn binder, and a gang plow, on—

Aug. 1, 1914	Oct. 15, 1921	Mar. 14, 1922
798	4214	2188

Number of Bushels of Corn

required to pay freight on above corn to Chicago and on the four farm implements from Moline, Ill. to Culbertson, on—

Aug. 1, 1914	Oct. 15, 1921	Mar. 14, 1922
178	1233	564

(a) In October 1921, comparing it with August 1914, how would you describe the situation?

(b) Considering that Culbertson is a typical country town,

SOLUTIONS

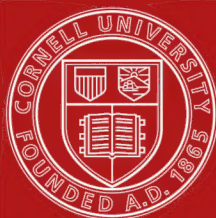
*1. (a) Conditions were out of line. Manufacture and transportation, compared with agriculture, were greatly inflated.

(b) Lack of farmer buying power.

(c) No. Farm labor conditions in the long run must balance up as attractive as other occupations in order to hold their own.

(d) A readjustment between farm conditions and industrial conditions was taking place.

*3. Business establishments are all inter-related. They are much more so, in fact, than your diagram shows.



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what depressing influence would be felt in industry during the autumn of 1921?

(c) Could this October 1921 situation continue? Why, or why not?

(d) What general conclusion would you draw from the March 1922 figures, in comparison with October 1921?

2. Describe briefly how the economic system works. What is meant by industrial equilibrium? business conditions out of line? (p. 8.)

*3. Draw a circle and write inside the name of your company, or a company the securities of which you hold.

Write at the left the names of the companies from whom you buy; draw circles around their names; connect these circles with your company's circle by lines. Write names in turn of companies from whom the above concerns buy; draw circles around them; and show connection by lines. Carry this several steps further, if possible.

Place at the right the names of companies, or customers, you sell to; draw circles around them; and connect by lines with your company. Place names of companies, or customers, the above companies in turn sell to. Show connections in the same way. Continue the process, as far as you conveniently can.

These other companies have business dealings directly with each other, or through concerns other than your own. Show such relations by circles and lines.

What important truth does your diagram prove?

4. What three questions does the forward-looking man find essential? (p. 11.)

5. What advantages have statistics over acquaintances and newspapers, as sources of dependable information? (p. 12.)

"The success or failure of a man engaged in manufacturing, transportation or agriculture, depends more upon his skill as a prophet than upon his industry as a producer."—ARTHUR T. HADLEY, President Emeritus Yale University.

EXERCISES

and Test Questions on

Ch. III. Fundamental Statistics made Usable

Ch. IV. How Different Series Move During a Cycle

*1. A certain writer includes marriage rates and immigration in his list of fundamental statistics, claiming that Professor Willcox of Cornell has shown that marriages and immigration in larger number occur during prosperous times than depressions. Would you include them? Why?

2. What three tests for deciding whether or not, a particular statistical series makes a good business barometer? (p. 27.)

*3. Which of the following two series makes a better barometer? Why?

- (a) Raw hide prices or soda cracker prices
- (b) Residential telephone calls or long-distance telephone calls
- (c) Salaries or wages
- (d) Wholesale prices or retail prices

4. Outline briefly the course of events during a cycle.

NOTE: Numbers 5, 6 and 7 below have been included for those who would like to know somewhat in detail how to solve statistical problems of the sort dealt with here. Others may skip these three exercises. The problems set for solution, however, have been made very simple, since this illustrates the method, which is the purpose in view.

*5. Transactions as follows took place in a certain commodity: 1917, 4 units; 1918, 6; 1919, 8; 1920, 10; 1921, 12; and 1922, 14. Remove the growth element from these statistics.

*6. In subtracting the February returns of a certain commodity from those of January, you find over a period of 21 years these differences:

+20, +38, -28, -214, +16, -20, -6, -72, +23, -12,

SOLUTIONS

*1. While Professor Willcox no doubt is correct, an alert business man can scarcely hold up his plans until young couples and immigrants have become aware of what business conditions are, decide what to do, and carry out their decision. Stock prices or pig iron production, for instance, present a much sounder and more sensitive business indicator.

- *3. (a) Raw hide prices
 (b) Long-distance telephone calls
 (c) Wages
 (d) Wholesale prices

These each reflect *more sensitively* changes in conditions. Soda cracker prices, for instance, particularly the retail price on trademarked brands, such as Uneeda, remain unchanged during long periods, whereas the market for raw hides fluctuates almost daily, if not several times a day.

*5. *Problem.* Transactions as follows took place in a certain commodity: 1917, 4 units; 1918, 6; 1919, 8; 1920, 10; 1921, 12; and 1922, 14. Remove the growth element from these statistics.

Solution.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
	y	x	x^2	xy		
1917	4	—5	25	—20	+5	9
1918	6	—3	9	—18	+3	9
1919	8	—1	1	— 8	+1	9
1920	10	+1	1	+10	—1	9
1921	12	+3	9	+36	—3	9
1922	14	+5	25	+70	—5	9
	—	—	—	—		
Total	54	0	70	70		

Substituting: $\Sigma y = m \Sigma x + nb$
 $54 = 0 + 6b$
 $b = 9$

$$\begin{aligned}\Sigma xy &= m \Sigma x^2 + b \Sigma x \\ 70 &= m70 + 0 \\ m &= 1\end{aligned}$$

- (2) y = Annual items, six in number; hence $b = 6$
- (3) x = Six months' period, since time is measured from mid-point of series, that is, half way between 1919 and 1920.
- (4) Obtained by squaring (3).
- (5) Products of (2) and (3).
- (6) Correction figures to be added to (2). Since $m = 1$ and 1917 is five periods distant, for example, the figure $+5$ when added to 4 eliminates growth element. Likewise -5 added to 1922 figures removes growth element.
- (7) Items as corrected for growth, or secular trend.

*6. (a) By averaging all the February differences in order, commencing with $+184$, and ending with -214 , we find the median, or number which divides the array into two equal groups, is -19 . On account of the seasonal variation, then, February normally runs 19 points below January. Adding 19 to 1791, gives 1810. This corrected figure compared with the similar figure for January, 1800, discloses a slight upward trend.

(b) The sum of the differences, when added, is found to be -588 . Dividing by 21 gives -28 , the correction figure.

(c) The correction figure obtained by the average of the monthly difference is 9 points larger than when the median is taken. This is due mainly to the fact that three Februaries showed a very large drop (-166 , -195 , -214) and these have affected the average, simply by the way it is calculated, more than the median. Since for securing seasonal corrections the influence of exceptional factors should be avoided, the median proves superior because it allows exceptionally large differences no more weight than small differences.

*7.

Bonds. $\$93.26 - \$89.94 = \$3.32$. Bonds in August $\$3.32$ under normal, which is 92 per cent of $\$3.59$; hence position was -92 per cent. $\$95.29 - \$93.26 = \$2.03$. Bonds in November were $\$2.03$ above normal, which is 56 per cent of $\$3.59$; hence position was $+56$ per cent.

New York Clearings. $\$10,380,000,000 - \$8,680,000,000 = \$1,700,000,000$. Clearings in August were $\$1,700,000,000$ under normal, which is 80 per cent of $\$2,110,000,000$; hence position was -80 per cent. $\$11,060,000,000 - \$10,380,000,000 = \$680,000,000$. Clearings in November were $\$680,000,000$ above normal, which is 32 per cent of $\$2,110,000,000$; hence position is $+32$ per cent.

—166, —11, +184, —21, +10, —24, —41, —33, —195, —19, —17.

(a) January 1922 returns, corrected for seasonal variation, are 1800. February 1922 returns, not corrected, are 1791. Correct February returns for seasonal variation and compare with January's.

(b) Suppose instead of the *median* you were to take the *average* difference as the basis of correction. What would the correction figure be?

(c) Which, the median or the average, is preferable? Why?

*7. Our 22 Industrial Bond Averages in August 1921 stood at \$89.94. New York Bank Clearings stood at \$8,680,000,000 (corrected statistics used). Four months later the bonds were \$95.29 and the clearings \$11,060,000,000.

What was the comparative position of each on the two dates?

(NOTE: Average of the bonds over 19 years is \$93.26; New York clearings \$10,380,000,000. Average amount of fluctuation on bonds is \$3.59, on clearings \$2,110,000,000.)

8. What are the three processes in making statistics usable for forecasting? (p. 26.)

"A study of past disturbances leads to the conviction that no severe depression has occurred which was not preceded by loud warnings. These warnings ought not to pass unheeded, and in order to recognize them promptly it is necessary that accurate statistics be furnished."—THEODORE E. BURTON, Congressman, ex-President Merchants National Bank.

EXERCISES

and Test Questions on

Ch. V. Statistical Series Sorted Into Groups

Ch. VI. Constructing the Index

*1. News that the Allied Fleet during the Great War had opened fire upon the Dardanelles forts, cabled to Chicago, brought about a drop in wheat of 4 cents a bushel. When at Lakeland, New Jersey, a short time afterwards, powder in a much larger volume was exploded, wrecking an entire industrial plant, wheat prices apparently were not affected at all.

Why this difference? Make use of statistical terms (though not figures) in giving your answer.

2. In preparing an Index, should pig iron production and commercial paper rates, for instance, be combined? Why, or why not? (p. 32.) How can you determine this? (p. 31.)

NOTE: Number 3 below has been included for those who want to make personal use of the Pearsonian formula. A simple problem has been chosen, but it illustrates the method.

*3. Two statistical series fluctuate as follows: *First*, 1918, 1 unit; 1919, 2; 1920, 3; 1921, 4; and 1922, 5. *Second*, during same years, 6, 8, 10, 12, and 14. Calculate the coefficient of correlation.

*4. Which of these series, during a cycle, move first? which lags? (Place at the right the series which move ahead, at the left the series which lags.)

(a) Pig iron, stock prices, interest rates.

(b) Wholesale prices, motor car prices, house rents.

5. In constructing the Index, what particular series repre-

SOLUTIONS

*1. Traders in wheat recognized that, were the Dardanelles to be opened, Russian wheat would flow into the world markets, thus lowering the price. Military success at the Dardanelles and wheat prices were thus correlated, in this case a negative correlation. The Lakewood matter had little or no correlation with wheat prices, hence its lack of effect upon the market.

*3. *Problem.* Two statistical series fluctuate as follows: *First*, 1918, 1 unit; 1919, 2; 1920, 3; 1921, 4; and 1922, 5. *Second* during same years, 6, 8, 10, 12, and 14. Calculate the coefficient of correlation.

Solution.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	x	y	Dev. x	Dev. y	(Dev. x) ²	(Dev. y) ²	(Dev. x)x(Dev. y)
1918	1	6	-2	-4	4	16	8
1919	2	8	-1	-2	1	4	2
1920	3	10	0	0	0	0	0
1921	4	12	+1	+2	1	4	2
1922	5	14	+2	+4	4	16	8
	—	—	—	—	—	—	—
Average	3	10					
Total.....					10	40	20

- (3) Difference between respective items of (1) and their average, 3.
 (4) " " " " " (2) " " " " 10.
 (5) Squarings of (3).
 (6) " " (4).
 (7) Product of (3) and (4).

Substituting in formula $\sigma = \sqrt{\frac{\sum d^2}{n}}$ we have

$$\sigma_1 = \sqrt{\frac{10}{5}} = \sqrt{2}, \text{ standard deviation of x's; and}$$

$$\sigma_2 = \sqrt{\frac{40}{5}} = \sqrt{8}, \quad \text{"} \quad \text{"} \quad \text{"} \quad \text{y's.}$$

Substituting in formula $r = \frac{\sum (xy)^1}{n\sigma_1\sigma_2}$ we have

$$r = \frac{20}{5\sqrt{2} \times 2\sqrt{2}} = \frac{20}{10\sqrt{4}} = \frac{20}{20} = 1$$

Coefficient of correlation between two series is +1.00.

*4.

Interest rates, Pig iron, Stock prices

House rents, Motor car prices, Wholesale prices

sent Business (using the term here in its narrower sense)? The Security Market? The Money Market?

"Statistics are the throttle valve of every business. USE them."—SIR ERIC GEDDES, Director Lever Bros. Ltd.

EXERCISES

and Test Questions on

Ch. VII. Constructing the Index

Ch. VIII. How the Index Provides Insight into Business

*1. "Almost the most important single item of knowledge that a business man can have," says Leonard P. Ayres, Vice-President of the Cleveland Trust Co., in *Administration*, "is that which tells him in what part of the business cycle he is at any given time. If business is at about normal it makes a great deal of difference whether it is at normal on the way up, or at normal on the way down. Largely in proportion as the business man knows about this most important matter will he be able to conserve his gains, and to guard against losses."

How does the Index cover this point? (p. 47.)

*2. The situation, let us say, is that shown by Figure 21. At another time it was that shown by Figure 22. What is your general opinion on the outlook in each case? (Note: This is not intended to represent a complete forecast. The latter includes an economic analysis, in addition to a statistical analysis, of the situation.)

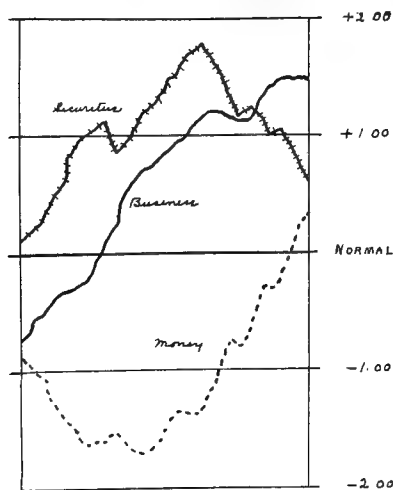


Figure 21

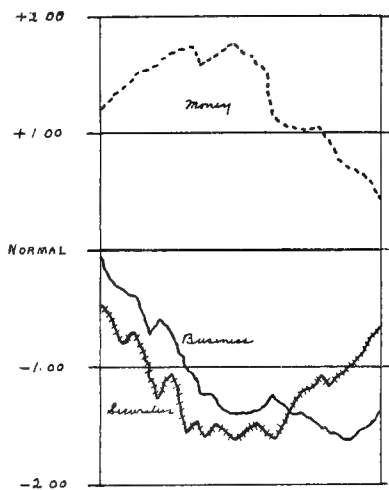


Figure 22

SOLUTIONS

*2. The outlook in Figure 21 is for liquidation in business. This appears already to have commenced in securities. Interest rates are likely to work higher.

The outlook in Figure 22 is for improvement in business. A continuation of the advance in securities, and decline in interest rates, is to be expected.

*4. (a) This was Controller of the Currency Crissinger, addressing the Florida Bankers' Association. He represented the Government, in other words the public.

(b) The other gentleman was Charles E. Mitchell, President of the National City Bank of New York. He presented the situation which at the time the Wall Street bankers faced.

(c) Business needs, in comparison with those of the security market, receive prior consideration.

During a depression, speculators and investors can obtain low rates because otherwise bank funds would be idle.

As improvement gets under headway, security loans, if continued on easy terms, may deprive business of needed funds. (p, 54-5.)

3. Why do security price changes *precede* movements in business? (p. 53.)

*4. In April 1922, after a bull move in securities had been running for several months, a prominent man addressing an association said: "The present is a most appropriate time for bankers to admonish their clients against over confidence in speculative investments. The world needs a restoration of opportunity to produce and consume things needed for human progress and bankers should keep in mind that the first call for liquid capital must be made in behalf of the farmer, the manufacturer, the exporter, and in general, the industrial and commercial community. It is equally important that banks be kept from overextending themselves by too liberal accommodations to speculative clients."

(a) Whom do you suggest this speaker represented?

In reply another prominent man, interviewed the next day, said: "The volume of call loans is not too large at present and is in no way interfering with a business recovery. Money is abundant. After taking care of all demands for commercial loans there is a large surplus that can only be loaned in the call money market."

(c) Whom do you suggest he represented?

(c) What important points are here illustrated?

5. Illustrate by diagram how loanable funds flow into and out of the credit reservoir.

"The biggest detriment to business are the men who plunge and then fail, lose their own time, their own money, and other people's money, because they cannot, or will not, look ahead."—ELIJAH J. SELLS, Senior Partner, Haskins & Sells.

EXERCISES

and Test Questions on

Ch. IX. What Good Forecasting Is Ch. X. Action

*1. "The surest way to stop this panic," declared the Governor of Oklahoma in 1907, "is to close the New York Stock Exchange."

"The dire straits the country now finds itself in," announced a Congressman, representing an agricultural section, in 1921, "can be laid directly to the Federal Reserve Board. In the most high-handed way it refused the credits sorely needed."

Was the Governor correct? the Congressman?

2. What wrong conceptions of forecasting must be guarded against? (p. 63.)

3. What plans do you make use of for applying the forecast of general business conditions to your own establishment? (Note experience of American Radiator and Westinghouse Electric, in this connection. Pp. 61-2.) How well are these plans working?

*4. An official of the General Motors Corporation had this to say regarding the last slump: "We came up to the boom times of 1919 and 1920. Our research bureau was constantly and insistently warning us that the break was coming. But our executives couldn't see it. We had three big factors to contend with that it was almost impossible to control.

"There was the sales department. It was booking orders away ahead and it couldn't see any reason to think a crash was on the way when orders were so far ahead of production.

"Then there was the production department that couldn't keep up with orders and was constantly calling for new construction and more material to work with. It couldn't see a crash under way when it couldn't keep up with the demands made on it.

"And there was the purchasing department, that saw prices for materials steadily rising and could readily foresee the time

SOLUTIONS

*1. Both the Governor and the Congressman were incorrect.

The Stock Exchange naturally becomes prominent during a panic, for liquidation then is urgent and securities can be liquidated more freely than other holdings. Those not well informed claim that manipulation, bear operators, are responsible, but the influence of these in fact is limited. Securities would fall anyway. Consequently, so far as an effective remedy for panics is concerned, closing the Exchange would prove much like closing a hospital during an epidemic, on the ground that there were so many sick people in it.

Conditions towards the close of 1919 were very much inflated, and could not continue. "Our problem, therefore," Governor Harding, of the Federal Reserve Board, stated very sanely, "is to check further expansion and to bring about a normal and healthy liquidation without curtailing essential production and without shock to industry, and, as far as possible, without disturbing legitimate commerce and business." During the liquidation which ensued, the Federal Reserve Board upon the whole dealt with the situation very satisfactorily.

Real liquidation always makes people uncomfortable; it cannot otherwise be brought about.

An interesting side-light on why the Federal Reserve Board is at times criticised, rather than the local banks, is given by Governor Harding, in *System*, in these words:

A man will come into a bank and want to borrow some money. The banker will say to himself, "I do not want to tell this fellow he is no good, but I would not want to lend him any money under any circumstances. I do not want to tell him I am loaned up full and hard-up, because he talks a lot and will go around and tell people, 'Why, that bank you have got your money in must be in a mighty tight fix, because I went over there and wanted to borrow \$100 from them, and they said they did not have the money.'"

So the banker passes the buck. He will say: "Now, old man, I'll tell you what the situation is. You are all right, and I wish I could let you have that money, but I cannot make the loan, because the Federal Reserve has told us not to make any more loans; and I

cannot let you have it.' That lets him out all right, but it creates a false impression, and a bad impression, generally, toward the Federal Reserve.

*5. Three well considered conclusions, representative of what more thoughtful men have come to believe, will be cited. Following these our personal conclusion is stated in a sentence.

"Whether or not it would be *desirable*," points out President Henry Dennison, of the Dennison Manufacturing Co., "to flatten out the line of business activity to the straight line of growth—I am inclined to think it would be undesirable to do so—it certainly is *impossible* to do it. However that may be, it is not the wave itself but the breaking crest of the wave that does the damage. We should therefore focus our attention upon the crest and try to discover and apply measures which we may reasonably expect to modify it."

"In judging all human affairs and the prospect of improvement," says President Verity, of the American Rolling Mill Co., "we must realize that human nature is the same today and that it will be the same tomorrow, as it always has been. It is not possible for the business of the nation to have reached a point where every business will be well managed or even soundly managed. I, however, do believe that efficiently managed business is on the increase and will continue to grow, as men become better informed on the basic principles under which successful business must be done."

"No competent student of the subject will assert," says W. C. Mitchell, economist and author of *Business Cycles*, "that the rhythmical alternations of activity and stagnation so characteristic of modern business can be entirely eradicated so long as we maintain the institutions of the money economy. We do not know what measure of success can ultimately be attained. But on the other hand, there is nothing in current theories of business cycles and nothing in the economic history of the past which forbids us to hope that by well considered measures we can mitigate in great part the sufferings which we undergo at present in consequence of booms and depressions."

The best measure for dealing with business changes is to increase one's ability to forecast them.

when the margin of profit would be wiped out, if it didn't lay in big stocks ahead. They couldn't see a crash in the face of rising prices.

"We were up against committee management. Each committee had its own point of view. Sales insisted on the orders ahead. Purchasing couldn't see anything but rising prices. A few of us could get the lesson taught by the research bureau, but we were outvoted by the optimists."

What important points does this illustrate? (pp. 64-5.)

*5. Can cycles in business be done away with, or shall we continue to experience them?

"The true Logic for this world is the Calculus of Probabilities, the only Mathematics for Practical Men."—JAMES CLERK MAXWELL.

"To foresee is to rule."—PASCAL.

II IMPROVEMENT

Rising security and commodity prices
Larger margin of profit
Increased production
Confidence restored

I DEPRESSION

Business stagnation
Unemployment
Keen competition
Increasing bank reserves

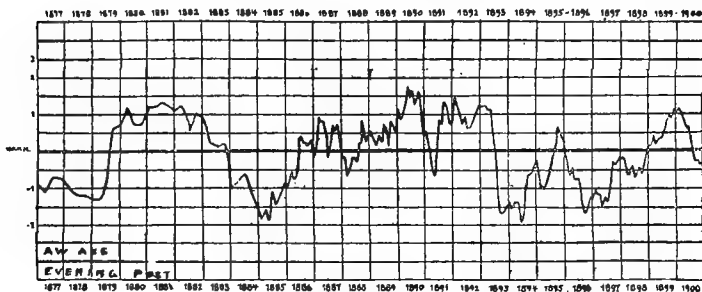
SEQUENCE OF EVENTS

III PROSPERITY

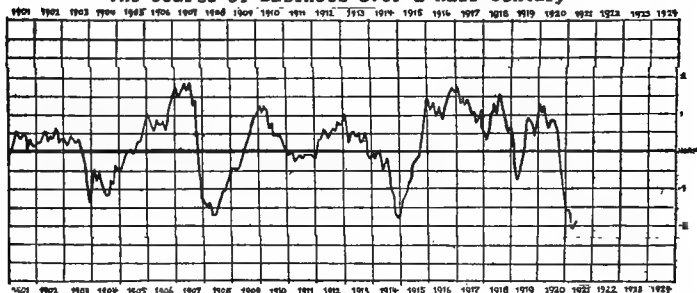
Production and profits large
Over-expansion and speculation
Waste and relaxed effort
Money strain develops

IV LIQUIDATION

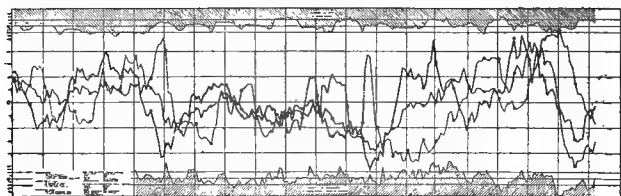
Prices break
Cancellation of orders
Lower production costs
Failures increase



The Course of Business over a Half Century



"The talent of the director of industry in the modern state consists in his capacity to foresee and exploit economic change, and his profit is proportionate to the accuracy with which his forecasts are made."—Henry L. Moore, Professor of Economics, Columbia University.



AMERICAN BUSINESS ASSOCIATES INDEX

Forecasting Business Conditions

By

ENOCH BURTON GOWIN

Editor-in-Chief, American Business Associates. Statistician.
Business and Security Market Analyst. Author
"Developing Executive Ability," "Buying or
Selling a Business," etc. Ph. B. Wisconsin. Ph. D. Columbia University.

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CHAPTER I

FORESIGHT

An intelligent discounting of the economic and financial future always pays.—Edwin M. Kemmerer, Professor of Economics and Finance, Princeton University.

We mustn't go it blind, or depend upon guesswork and hunches and inspiration. We must know.—F. L. Lamson, Treasurer, Norwalk Tire & Rubber Company.

Where Foresight Becomes Essential

The conditions of general business *outside* its own establishment determine very largely what headway a company can make.

Should these conditions be prosperous, customers buy freely, at advancing prices, and a good margin of profit. Money is easy. Banks are willing to make loans. Profits are large. At other times, however, orders become hard to get; prices have to be cut, even below cost; part of the plant remains idle. Money is tight. Inventories must be marked down. The business perhaps shows a deficit. The same management has continued in charge, the same products are dealt in. But conditions outside have changed.

Every manufacturer, dealer, speculator, investor, or banker, therefore, if he is to lessen, or avert, risks and take advantage of favorable openings which develop, should know what business conditions at a given time are and discount their changes.

Providing the Basis for Scientific Forecasts

Changes in business conditions catch the great majority of men unprepared. This has proved so during panics, as shown by the number of failures reported. But neglect to take quick advantage of improving conditions after crises, may also be pointed out. Lack of forehandedness, due chiefly to lack of

knowledge, appears characteristic, whatever position business at a given time has reached.

Changes occurring in business, however, are not accidental. Crises and booms, and all degrees of variation between them, are due to fundamental economic forces. Such forces, when properly measured and the results interpreted, enable one to predict their effects *before* these occur, and thus discount or take advantage of them.

No other practical problem facing us, it is true, proves so complex as this, the forecasting of business conditions. At the same time none other offers such large rewards. Let us commence upon it by considering, in bird's-eye view, how the organized system called business really functions.

Modern business, we are told, has become highly organized. What is this economic system like? How does it operate?

How Our Economic System Operates

The extractive industries—agriculture, mining, herding, lumbering and fishing—represent the first step in the chain of business processes. Raw materials, such as grain, coal, and mineral ores, provided by these extractive industries pass on through successive operations of manufacture and trade until, in more or less prepared form, as bread, steel rails, houses and other products, they are consumed. See Figure 1, which pictures this never ending flow from producers of raw materials through to the ultimate consumer. But these ultimate consumers are not located at the end of the line, idle recipients merely, but stationed at various places *within* the productive mechanism itself, and can only be supplied by a *back* flow of commodities and services toward them. These persons are consumers because, and in the long run only because, they also are producers. The mechanism itself, in addition, must be kept up, hence a portion of the goods produced is diverted into the replacement fund.

This flow and back flow constitute a circulation, which receives from and provides economic goods for every unit functioning within the business mechanism.

What has this to do with the establishment which you manage, or the securities of which you hold? This establishment, though apparently independent, really is not so. It depends for its raw materials and partly finished products upon units preceding it, and for its market, and final returns, upon other units which follow. All concerns, the reader's own included,

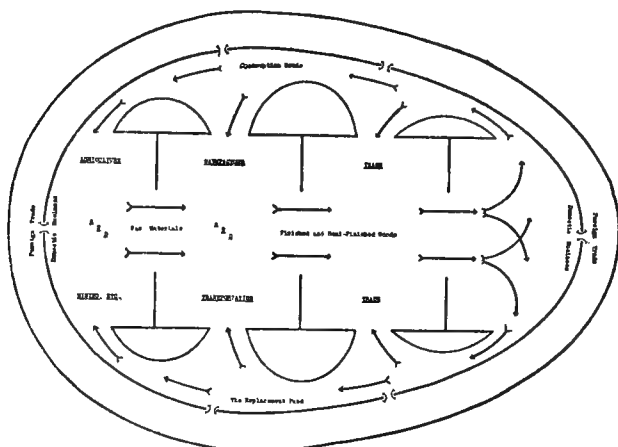


Figure 1: How Our Economic System Operates

This chart pictures the flow of economic goods from stage to stage, commencing at the left with raw materials. These goods become separated at the right into (a) "consumption goods" which currently are used up; and (b) "the replacement fund" which maintains the mechanism intact. (Adapted from Seager, Principles of Economics.) The circulation of goods thus described constitutes domestic business. Connections are also made with foreign business, represented here by the band around the outside.

in buying and selling commodities, services or rights, for present or future delivery, are in these essential operations of business inter-related and inter-dependent. The different industries and establishments dovetail one into another until the whole forms a single vast complex machine. Like a cog, every establishment, and even every business man, fits into it.

Industrial Equilibrium, or Balance

This industrial mechanism, if it is to function properly, has to be kept continually co-ordinated. Farmers, miners, manu-

facturers, railroad men, merchants, equipment, capital—all should be employed, but none overworked and none idle. Each unit then performs the part apportioned to it. A gradual growth and improvement takes place, but the outstanding characteristic otherwise is equilibrium, a vast economic mechanism functioning in delicate balance.

Every man who has managed a factory, or almost any enterprise for that matter, knows how difficult it is to keep everything lined up, moving smoothly. His sales, production and finance *ought* to dovetail, but in practice they often get *out of line*. Multiply these difficulties by the thousands, increase their complexity, and we realize why the directive intelligence in modern business always functions much below par.

Mal-adjustments occur, in consequence. Certain classes in comparison with others, as farmers and railroad labor in 1921 for instance, are overpaid, or underpaid. The various commodities and industries at a given time are unevenly inflated, or liquidated. These and similar facts indicate that our industrial mechanism is *not* in balance. In 1906, 1916 or 1919, for instance, all boom periods, and in 1908, 1914 and 1921, periods of depression, business was far out of line. "Normal" business conditions, in fact, are infrequent and of brief duration.

Looking Ahead for Changes

Business conditions as they change—their trend being practically always above or below normal and therefore out of line—run through a more or less regular sequence, termed the cycle.

The business cycle, as Professor Wesley Clair Mitchell points out, "is merely a vivid term for this recurrent ebb and flow of business activity which past experience has taught the way to expect. Depressions pave the way for business revivals, revivals develop into 'booms,' booms breed crises, and crises run into depressions. A tolerably regular repetition of such cycles can be traced in American experience for at least a century. Similar cycles run their rounds in all countries of highly developed business organization." Our own country, as shown

by the frontispiece chart, "The Course of Business Over a Half Century," has particularly been subject to them.

Looking ahead over the next decade or two, we can count upon experiencing several cycles and of having to deal all the while with conditions which change.

What Business Men Need to Know

Into the economic system above described, with its complex relations and changes, the reader has to fit himself, and do business. When buy, or sell, commodities or securities? When expand, or contract, operations? Hard work and years of experience will not advance a man far unless, upon these matters, reasonably correct decisions are reached.

We consequently should bring into use well-devised methods, whereby such decisions can be made. In addition to the more detailed points covered, as will be described later, these methods must deal intensively with the following essentials:

1. What is the *position* of business now? To what extent is it out of balance; that is, how far above or below normal is it?
2. What is the *trend* of business? In which direction have conditions been moving? And how fast?
3. What *outlook* for business later on? Under what economic forces are conditions being shaped? their relative strength? and calculated future effect?

CHAPTER II

MEASURING BUSINESS CONDITIONS

Why Statistics Prove Essential

By talking over conditions with his friends or reading the newspapers, a man never gains dependable information upon the essentials just cited. Business has become too complex to permit this. There are too many inter-relations involved, and complicated changes. Feeling unable to cope with these difficulties, managers and investors in large number employ guesswork, and arbitrary estimates. Their risks thereby are very greatly increased.

During the last few years, accounting and statistical reports have been devised which show a person, currently, the trend of operations within his own establishment. Those at the head of a business, once accustomed to making use of these reports, could not be persuaded to dispense with them and depend once more upon mere impressions. For dealing with outside business conditions, which are more complicated and harder to keep in touch with than any single company's affairs and yet even more essential to know, why not make use also of properly devised reports?

"What business needs generally," says President Henry Dennison, of the Dennison Manufacturing Company, "is not less vigilance on the part of individual concerns as to the special conditions affecting particular lines, but a very much larger and more detailed body of information, gathered widely and authoritatively, and distributed promptly and frequently, regarding the things that both govern and exhibit the currents at work to bring about and accelerate or retard the fluctuations of the business cycle."

Fundamental Statistics

What should this body of information, depended upon to provide one sound insight into conditions, include?

Statistical data, chiefly. General impressions and discussions about business, it is true, have a certain value. And sound reasoning cannot be dispensed with. But facts, statistical data, provide the essential core of our information. Statistics can be handled and compared. They enable us to *measure* business conditions, and deal with them quantitatively. "When you can measure what you are speaking about and express it in numbers," Lord Kelvin very well says, "you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind." For business forecasting, therefore, statistics provide the main source of data.

Statistics concerning general business conditions may be termed *fundamental*, in contrast to those referring to a particular company. Their service as indicators of underlying conditions and changes may be illustrated in brief.

The basic industry of the United States, it is commonly agreed, is the production of iron and steel. These raw materials enter, directly or indirectly, into every kind of business carried on. All persons consume in one form or another iron and steel products. The amount of pig iron produced, in consequence, rises and falls as industrial and trade conditions change. Were statistics on pig iron production regularly collected, and made available, would they not show reliably business expansion and contraction?

Coke and anthracite furnaces in blast make reports monthly to the *Iron Age*, and have, practically all of them, been doing so for many years. These reports on production are compiled and both daily and monthly averages printed regularly. Much more reliable, and convenient as well, than a mass of general opinions *about* business are these fundamental statistics on the trend of iron.

Pig iron production, of course, represents only one series. Various others, such as bank clearings, commodity prices, and

FUNDAMENTAL STATISTICS

Representative Statistical Series Available for
Forecasting Purposes

STATISTICAL SERIES	SOURCE OF DATA*
Pig Iron Production	Iron Age
Bank Clearings Outside New York	Commercial and Financial Chronicle
Commodity Price Index	Bradstreet's Review
Stock Market Averages	American Business Associates
Bond Market Averages	American Business Associates
New York Bank Clearings	Commercial and Financial Chronicle
Sixty-to-Ninety Day Commercial Paper	Commercial and Financial Chronicle
Four-to-Six Months Commercial Paper	Commercial and Financial Chronicle
Freight Car Loadings	American Railway Association
Cattle Slaughtered	Federal Reserve Bulletin
Hogs Slaughtered	Federal Reserve Bulletin
Cotton Consumed	Federal Reserve Bulletin
Wool Consumed	Weather, Crops, and Markets, U. S. Department of Agriculture
Tobacco Manufactured	Monthly Reports, Internal Revenue Commission
Steel Ingot Production	Iron Age
Coke Production	Federal Reserve Bulletin
Paper Production	Federal Reserve Bulletin
Leather Production	Survey of Current Business, U. S. Department of Commerce
Lumber Production	Federal Reserve Bulletin
Bituminous Coal Production	Weekly Reports, U. S. Geological Survey
Anthracite Coal Production	Weekly Reports, U. S. Geological Survey
Crude Petroleum Production	Weekly Reports, U. S. Geological Survey
Copper Production	Engineering and Mining Journal
Zinc Production	Survey of Current Business, U. S. Department of Commerce
Winter Wheat Crop Condition	Weather, Crops, and Markets, U. S. Dept. of Agriculture
Spring Wheat Crop Condition	Weather, Crops, and Markets, U. S. Dept. of Agriculture
Corn Crop Condition	Weather, Crops, and Markets, U. S. Dept. of Agriculture
Oats Crop Condition	Weather, Crops, and Markets, U. S. Dept. of Agriculture
Cotton Crop Condition	Weather, Crops, and Markets, U. S. Dept. of Agriculture

*Various trade journals, in addition to those cited, publish some of these statistics. The *Analyst* and the *Journal of Commerce* are good general sources, for instance. Newspapers also give several of the series wide currency. For continuous statistical work, however, we find the above sources best. Data covering all these series, with the exception of the crops, can be had monthly.

the number of freight cars loaded weekly by the railroads, are available for use. See accompanying table which lists the more important statistical series.

On account of the way they reflect commercial and industrial changes, fundamental statistics may well be termed barometers. The powerful economic forces which they represent determine what business conditions will be.

Intensive Methods Necessary

An examination of the various statistical series published currently does not, in itself, provide the definite insight into business which we need. The information obtained, it is true, easily surpasses general impressions, such as one obtains from newspapers and acquaintances. But fundamental statistics, for our purpose of forecasting, represent *merely raw material*, which must be thoroughly worked over before forecasts desired can be produced from them.

The task ahead, then, is much the same as that of any manufacturer—from available raw materials to produce the most useful product.

The technical processes here employed, instead of being mechanical, are statistical in nature. These processes will be described step by step, so that one may make use of them and have confidence in forecasts derived from them. The description, at the same time, will be made non-technical, and the statistical calculations much compressed and subordinated mainly to the footnotes. Though forecasting represents a complex problem, we trust that this presentation of it will be clear.*

*The quotations on pages 10, 12, 61, and 64 are reproduced from the excellent series of articles on the business cycle published by the *New York Evening Post* during the autumn and winter of 1921. The frontispiece chart, prepared by Mr. E. W. Axe, is also from the same source. The series used by Mr. Axe and the relative weight allowed each, are: Outside bank clearings 25; pig iron production 20; railroad traffic 15; failures 10; copper production 5; cotton consumption 10; coal production 5; and commodity prices 10; total 100. The entire eight series did not become available until 1903. Cf. *Evening Post*, October 17, 1921. The liberty has been taken of inserting Mr. Axe's name, and that of the *Evening Post*, in the reproduction. For the quotation on page 62, we are indebted to *Factory*, the magazine of management published by the A. W. Shaw Company.

The author's interest in the statistical methods described herein was first aroused by

Karl Pearson's *Grammar of Science*, particularly the chapter on causation; and more directly by J. P. Norton's *Statistical Studies in the New York Money Market*. What Professor Norton called the "elements of the polygon" and "anticipatory" correlation as distinct from "immediate" correlation, opened up lines of thought which in the author's business connections and problems have proved fruitful ever since.

For further study of business cycles and statistics, the reader has commended to him these works: W. C. Mitchell, *Business Cycles*; H. L. Moore, *Economic Cycles*. Ibid, *Forecasting the Yield and the Price of Cotton*. Warren M. Persons, "Correlation of Economic Statistics," *Quar. Pub. Am. Statistical Asso.*, Dec., 1910, pp. 287-322. Ibid, "Construction of a Business Barometer," *Am. Economic Rev.*, Dec., 1916, pp. 739-69. Professor Persons has since made notable contributions to statistical science as Editor of the *Harvard University Review of Economic Statistics*. A. L. Bowley, *Elements of Statistics*. H. Secrist, *Introduction to Statistical Methods*. G. U. Yule, *Introduction to the Theory of Statistics*. C. J. West, *Introduction to Mathematical Statistics*. The works of Moore, Yule, and West are for those mathematically inclined. *Business Statistics*, edited by M. T. Copeland, contains numerous articles describing the application of statistics to practical business problems.

CHAPTER III

FUNDAMENTAL STATISTICS MADE USABLE

How Fundamental Statistics Become Significant

By bringing together figures on bank clearings, freight car loadings, production, and other fundamentals, one obtains an idea of mass or bulk, of how much. But this is not the significant point. Comparisons with previous figures must be made, different series compared currently with each other, in order that *changes* which are taking place may be detected and measured. These changes, and not mass or bulk, are significant.

Bank clearings during a period of improvement, for instance, since they measure volume of transactions, increase. Commodity prices during a period of liquidation decline. Pig iron production from prosperity to depression or depression to prosperity, varies in tonnage. Statistics of \$10,000,000,000 bank clearings, 178 the commodity price index, and 2,800,000 tons pig iron, however, alone and unrelated, have little importance.

Fundamental statistics become significant by indicating changes in business conditions. Their value increases the more accurately they can be made to reflect these changes.

The Correct Use of Statistics

It might seem that by plotting on graphs various statistical series, the curves over a period of years would show changes satisfactorily, thus enabling the desired comparisons to be made. Proper statistical treatment of the figures becomes necessary, however, as a concrete instance makes clear, before this can be done.

Bank clearings outside New York averaged \$5,210,000,000 per week during a certain month and \$12,110,000,000 during another. Does this mean that business between these periods had become more than twice as active?

Upon plotting outside bank clearings over a period of years, as has been done in Figure 2, the rise of the curve toward the right becomes apparent at a glance. Clearings, on account of the *growth* of the country and consequently in the volume of transactions cleared through the banks, *increased*, upon the whole, regardless of the ups and downs of business meanwhile. The clearings of \$5,210,000,000 in October, 1906 were large, compared with the averages then prevailing, reflecting the prosperity of that period; whereas the \$12,110,000,000, because of a much later period, February, 1921, fell much below what had then become average, and hence indicated deep depression.

This growth element has to be taken into consideration before the significance of changes in a statistical series becomes properly clear. Better still such growth, or, as it may be somewhat more accurately termed, the secular trend, should be eliminated from the statistics before they are compared.

Eliminating the Growth Element

Since the various series to be used—bank clearings, pig iron production, commodity prices, etc.—have *different* rates of growth, a method for removing the growth element which can be applied to each, is needed. This method will now be described.

The rate of growth is found by “fitting” a straight line to the data. (See line A B in Figure 3 which has been fitted by the mathematical “method of moments.”*) The angle or upward

*The equation of the line to be fitted, by the method of moments, is:

$y = MX + B$ in which y represents the annual items, n the number of items, and x the time from any point of origin. (x , in our calculations, was taken as the mid-point of the nineteen year period.)

Then

$$\Sigma y = m \Sigma x + nb$$

$$\Sigma xy = m \Sigma x^2 + b \Sigma x$$

Identical results can be secured by the well-known method of least squares. The formulae to be used are:

$$m = r \frac{\sigma_y}{\sigma_x}; b = \bar{y} - m\bar{x}; y = mx + b \text{ in which } r \text{ is the coefficient of correlation with}$$

time, σ the respective standard deviations, and $\bar{x}$ and $\bar{y}$ the arithmetic means of the two series. The calculations required by these formulae are, however, more laborious than where the method of moments is used.

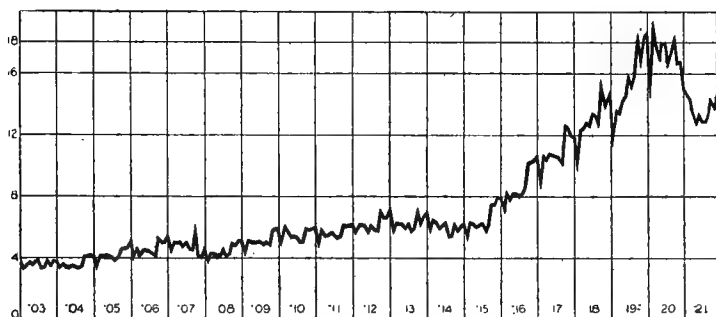


Figure 2: Outside Bank Clearings

Bank clearings over a period of years, on account of the growth of the country in population, resources and trade, show an upward trend. Our problem is to measure this upward trend, or growth element, that we may remove it from the statistics.

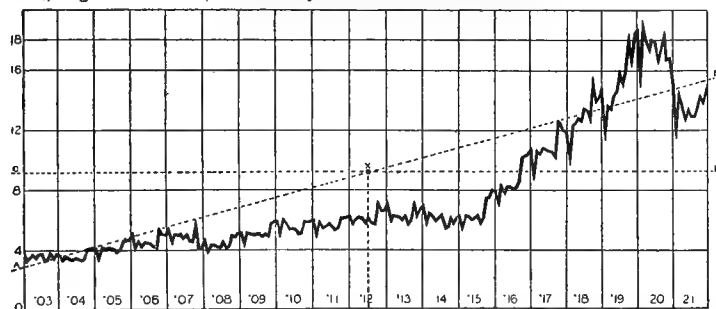


Figure 3: Line of Growth Fitted

The line A B is fitted to the clearings curve by the "method of moments." Where drawn it comes the *nearest* to all points of the curve that any straight line can. The *slope* of this line A B shows the amount of growth, which in this case is \$55,000,000 per month. C D is horizontal. A must now be raised to C and B at the same time lowered to D, the line A B revolving on X.

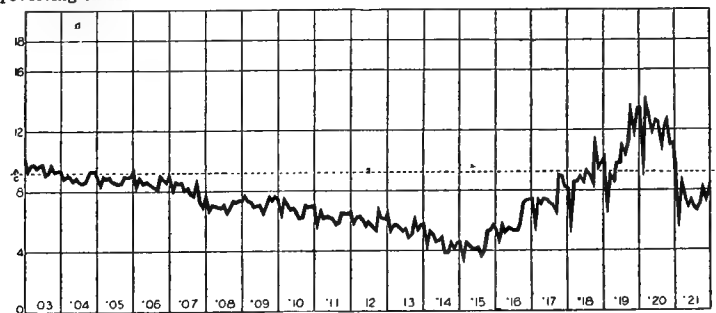


Figure 4: Growth Element Eliminated

The growth of \$55,000,000 per month now found, we commence at X and subtract that sum from each month's clearings cumulatively toward the right and add equivalent sums cumulatively toward the left—which swings A B around to horizontal, on C D. The curve retains the same relation to A B as before, the growth element only having been eliminated.

LONG RANGE GROWTH ELEMENT

Amount of Change Monthly—Increase or Decrease—Due to
“Growth” Element

(Period Covered 1903-21)

STATISTICAL SERIES*	UNIT	MONTHLY CHANGE
Pig Iron Production	Thousand Long Tons	5.64
Bank Clearings Outside New York	Ten Million Dollars	5.5
Bradstreet's Commodity Prices	One Dollar	.045
Twenty-Two Speculative Stocks	One Dollar	.065
Twenty-Two Industrial Bonds	One Dollar	.129
New York Bank Clearings	Ten Million Dollars	5.8
Sixty-to-Ninety Day Commercial Paper	One per cent	.0043
Four-to-six Months Commercial Paper	One per cent	.0017
Cattle Slaughtered	Thousand animals	.827
Hogs Slaughtered	Thousand animals	6.36
Cotton Consumed	Thousand Bales	.80
Wool Consumed	Hundred Thousand Lbs.	.82
Tobacco (large cigars)	Million cigars	.28
Steel Ingot Production	Thousand Long Ton	7.33
Coke Production	Thousand Short Tons	-2.74
Paper Production†		
Leather Production†		
Freight Car Loadings†		
Lumber Production	Million Board feet	-1.86
Bituminous Coal Production	Ten Thousand Short Tons	9.18
Anthracite Coal Production	Ten Thousand Short Tons	.33
Crude Petroleum Production	Ten Thousand Barrels	13.05
Copper Production	Million Pounds	.27
Zinc Production	Ten Short Tons	13.71
Winter Wheat Crop Condition‡		
Spring Wheat Crop Condition‡		
Corn Crop Condition‡		
Oats Crop Condition‡		
Cotton Crop Condition‡		

*The make-up of these series, in case special points arise, is considered later. Cf. footnote pps. 00 particularly.

†Statistics available only since January 1, 1920 on leather, July, 1918 on paper, and October, 1917 on freight car loadings, too short a period for determining what the growth element is.

‡These statistics are given as percentages of “normal” crop, not as total bushels produced, hence correction for growth is unnecessary.

slope of such a line shows what the rate of growth over a period of years is. For outside clearings during the period here covered, the growth is found to be \$55,000,000 monthly. Subtracting this amount from each month's figures over that of the month before, accordingly, eliminates the growth element.

This same method applied to various other statistical series enables us to work out the foregoing table of results.

Changes Due to Seasons

Many businesses as a usual thing, quite outside the cycle of prosperity and depression, are more active during certain *seasons* of the year than at other times. The retail coal business and the retail ice business are familiar instances, but, though in a less pronounced way, other trades and industries have also a seasonal trend. This seasonal trend, then, needs to be considered, and a method devised for removing it.

Such a method has been devised* and the following table of corrections worked out by means of it. When these corrections are applied to the respective monthly items, their seasonal variations are eliminated. See Figure 5, where outside bank clearings are dealt with.

At the present time monthly data covering a sufficiently long period of time to render the calculation of seasonal fluctuations trustworthy are not available for a number of series, hence the correction of such items must wait until a later period.

*The method devised has been, in connection with a particular series, to subtract each month's data from those of the preceding month, sort all these differences according to respective Januaries, Februaries, etc., arrange the differences in order from highest to lowest, find the medians for the respective months, and use such medians for eliminating the seasonal fluctuations.

In devising this method, consideration was given to the fact that the changes in a statistical series which occur over a period of years are made up of four main elements:

1. Long range, or secular, trend, usually though not always representing a gradual upward growth and hence referred to as the growth element.
2. Seasonal variations.
3. Cycle changes.
4. Exceptional influences, arising out of catastrophies, wars, politics, etc.

Long range growth eliminated, the changes found by subtracting one month's data from the preceding are made up of the latter three elements. Of these, numbers 3 and 4 commonly produce wider and more irregular changes than number 2. The median, however, owing to the way it is calculated, allows extreme items no special influence. Hence it, rather than the arithmetic average, has here been used.

SEASONAL VARIATIONS

Monthly Change—Increase or Decrease—Due to Seasons*

(Period covered 1903-21. Unit same as in Table page 00.)

STATISTICAL SERIES	JAN.†	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Pig Iron Production	-140	-113.6	+245.3	-83.6	+64.4	-127.6	+8.4	+71.4	-7.6	+147.3	-102.7	+38.3
Bank Clearings Outside New York	+14	-99	+72	-17	-14	-7	-7	-39	+9	+95	-21	+14
Bradstreet's Commodity Prices	+25	-.04	-.08	-.07	-.07	-11.	+.01	0	-.01	+.04	+.03	+.05
New York Bank Clearings	+87	-205	+103	-7	-11	-7	-14	-50	-12	+151	-79	+44
Sixty-to-Ninety Day Commercial Paper	-35	-.07	+12	-.01	-.02	-.01	+12	+16	+.09	0	-.06	+.03
Four-to-Six Months Commercial Paper	-.33	-.04	+.07	-.03	0	+.01	+11	+12	+.09	0	0	0
Twenty-two Speculative Stocks†												
Twenty-two Industrial Bonds†												
Winter Wheat Crop Condition¶												
Spring Wheat Crop Condition¶												
Corn Crop Condition¶												
Oats Crop Condition¶												
Cotton Crop Condition¶												

*These figures, since they show the respective amounts which each month is above or below the preceding, when used in making the seasonal corrections are to be reversed in sign.

†The January median has been adjusted so that the pluses and the minuses of all the months would be equal, the seasonal variations thus being eliminated without otherwise raising or lowering the data.

‡The variations of these two series are wide but lack distinct seasonal trend.

¶Crop condition reports are given in percentages of a "normal" crop of that time, hence these series are without seasonal variations.

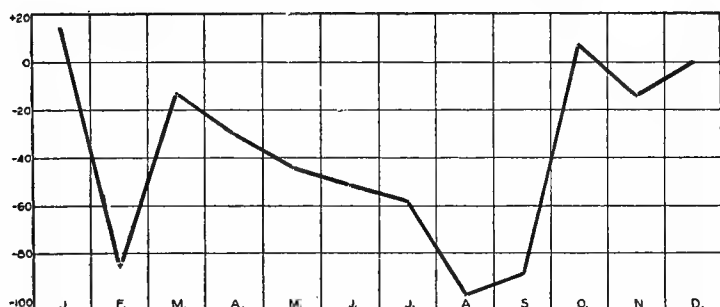


Figure 5: Seasonal Fluctuations in Bank Clearings

Outside bank clearings over a period of years normally run some \$990,000,000 lower in February than in January, and in March advance some \$720,000,000 over February. Note chart, the scale being in units of ten billion dollars. Since February's change normally run \$990,000,000 lower than January, this seasonal fluctuation can be eliminated and February returns made comparable to January's by adding \$990,000,000 to them. Likewise March clearings become comparable with February's, so far as the seasonal element is concerned, when \$72,000,000 is subtracted from them. Continuing this process for the remaining months, the series is corrected for seasonal variation.

A Common Measure of Variability

Our statistical series, now that long range growth and seasonal variations have been eliminated from them, exhibit with increased accuracy changes due to the business cycle. This, for forecasting, represents an important gain.

Though they all measure cyclical changes, certain series express their measure of these changes in tons—as pig iron production, for instance—others in dollars, others in per cents, and others in bushels or barrels. Different units such as these cannot be averaged, nor without more or less difficulty can they be compared.

Moreover, these series differ markedly in the *extent* with which each fluctuates. See Figure 6, for instance, in which the price of 22 stocks are compared with 22 bonds. Stocks fluctuate much more widely than bonds. Were such unlike fluctuations averaged, or compared, items varying widely would tend to obscure the smaller, but perhaps none the less significant, fluctuations of other series.

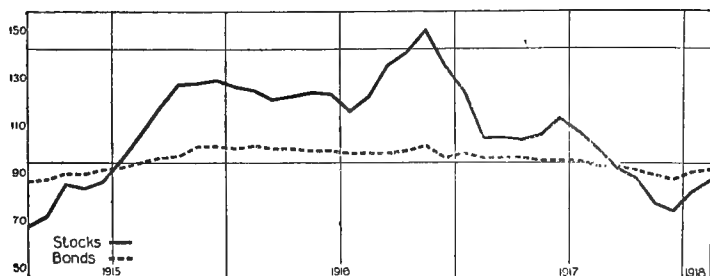


Figure 6: Stock and Bond Prices

Stock prices, represented by the averages of 22 leading speculative issues, fluctuate much more widely than bond prices, based upon 22 industrial issues. Fluctuations in both cases are measured in dollars. Bond market changes here have been more or less covered up.

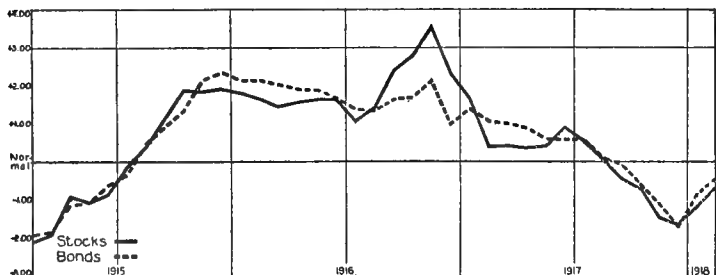


Figure 7: Stock and Bond Prices Made Properly Comparable

The same data appear in this figure as in Figure 6 above. But the fluctuations of both stocks and bonds have been compared with the respective average monthly fluctuations of each during 1903-21, and thus the significance of narrower changes in the bond market is not obscured.

That which is needed, in order to solve both these difficulties, is a common measure of variability. Such a measure has been devised.

For normal—the base line from which to measure changes in a series, such as pig iron production, upward or downward—the average for the series over a period of years was taken. Whenever any statistical series stands at 0, therefore, one may know that conditions reflected by it are normal. Conditions are, however, rarely normal, but either above or below it. These monthly *differences from normal* for each series over nineteen years were found by subtraction, and then averaged.

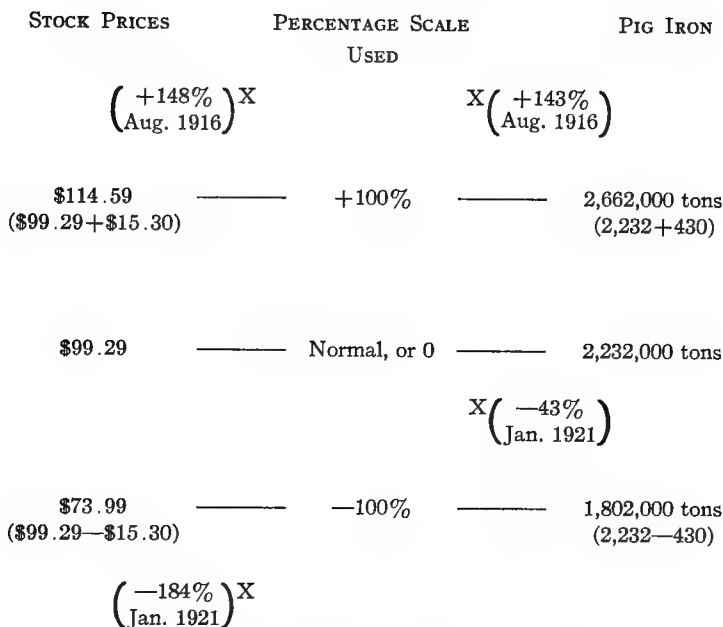


Figure 8: Comparing Stock Prices and Pig Iron

Stock prices stood at \$122.06 in August, 1916 and at \$71.00 in January, 1921. Pig iron production at the same dates (corrected statistics used) was 2,850,600 tons and 2,047,100 tons. What was the position of the stock market and the pig iron industry on both these dates? And how did the change made by each between these two dates compare? Solving this typical problem illustrates how useful our method really is.

Normal for these twenty-two stocks, we find, is \$99.29; for pig iron 2,232,000 tons. Stocks over a period of nineteen years have fluctuated upon the average \$15.30 above or below normal, hence \$114.59 (that is, \$99.29 plus \$15.30) represents +100 per cent on the scale and \$73.99 (\$99.29 minus \$15.30) -100 per cent. Pig iron production has fluctuated 430,000 tons above and below the normal of 2,232,000 tons, hence 2,662,000 tons on the scale represents +100 per cent and 1,802,000 tons -100 per cent.

Both stocks and pig iron in August, 1916, we then find, had passed beyond the average amount of fluctuation for the years 1903-21, and stood at 148 and 143 per cent plus. By January 1921 stocks had fallen to the very low point of 184 per cent minus, or 84 per cent farther than the average monthly fluctuation during the nineteen years. Pig iron production had not at the time, by 57 per cent, reached the point of the nineteen year average monthly fluctuation.

Though they fluctuated unequally in extent and one is expressed in dollars and the other in tons, the respective positions of stocks and pig iron on both these dates thus become clearly apparent and can be readily compared.

The average difference from normal thus found represents 100 per cent; +100 per cent means above normal and -100 below. Each difference month by month is then compared with this average, or 100 per cent difference; and the per cent which it is above or below normal, thereby is found. See "Comparing Stock Prices and Pig Iron," on page 25, where a problem illustrating this method has been worked out; also compare Figure 7 with Figure 6.

Where the current statistics of a series are thus compared with the amount this particular series has been fluctuating for years, and all changes are expressed in per cents above or below normal, one can readily, and with considerable accuracy, sense the position of a series at any given time.

Summary

Statistics enable us to measure the ebb and flow of business. However the various statistical series employed for this purpose reflect long range growth and seasonal variations in addition to cyclical changes; they have different rates of growth and seasonal variations; are expressed in several kinds of units; and vary some more widely than others. Our first task consequently has been to:

1. Eliminate long range growth, or the secular trend.
2. Eliminate seasonal fluctuations.
3. Reduce all items to a common measure of variability.

Corrected by the methods described, the statistical series become reliable business indicators. These statistics do not show volume or bulk, since in forecasting this does not primarily concern us. They do show *comparative position and change* which above all are significant. Fundamental statistics, through the foregoing methods, therefore, are made usable.

CHAPTER IV

HOW DIFFERENT SERIES MOVE DURING A CYCLE

Series Most Suitable as Barometers

Not all statistical series, even though worked over in the way described, are equally valuable in measuring business changes. Which series, accordingly, and how many, should be used?

Persons interested in barometer statistics but not themselves in the habit of making forecasts based upon them, recommend from time to time miscellaneous assortments of statistics—fifty or perhaps even a larger number of series—to be compiled and kept up to date. Business men often attempt to do this. Look upon forecasting, however, as a practical matter, much similar to manufacturing, in which statistics constitute raw material only, and it becomes evident that the value of different series depends upon how each *serves the purpose*. Masses of statistics merely heaped up have less value than a few well-chosen series, properly worked over and made usable.

The particular series we use, described on later pages, have been chosen because they are *important*, in that the transactions they summarize run into large totals; *varied in nature*, providing thereby a composite, and more dependable, picture of the situation; and *sensitive to change*, reflecting quickly the ebb and flow of conditions. A series satisfying these tests, in short, is representative and flexible. Statistics less suitable have been relegated to a subordinate place, or dropped entirely.

In Which Order Do Different Series Move?

Once suitable series have been chosen, the order in which the different series fluctuate must be investigated. Do they, in swinging now above and then below normal as business conditions change, all move *abreast* or in *sequence*? Are interest rates ahead, or behind, stock prices, for instances, as business

following a depression turns the corner? Do commodities prices or bond prices, at the close of a boom, more quickly turn downward indicating the approaching industrial slump?

Should certain series move ahead of others, either upward or downward as conditions change, significant cross-comparisons, or reasoning from one series to another, become possible. Series alike in the order of their fluctuations, moreover, could legitimately be combined into one group, thus simplifying and making clearer their effect.

The action of various series during a typical business cycle, accordingly, will be noted. Such a cycle passes through four phases, or periods:

- | | |
|----------------|----------------|
| 1. Depression | 3. Prosperity |
| 2. Improvement | 4. Liquidation |

Descriptive Analysis of Cycle

The period of liquidation immediately prior to the *depression* with which we commence has brought security prices to a low level. Commodity prices have been deflated, but even so consumer buying power, due to unemployment on a large scale, business losses and general pessimism, remains restricted. Few plants run at capacity. Manufacturers and traders work off old stocks. Frozen credits are gradually thawed out. Money accumulates in the banks. Interest rates decline in consequence, but new speculative ventures, which might call for funds, do not at the time appear attractive. High-grade bonds, however, an exception to the prevailing stagnation, commence to rise. Investment stocks also, when their yield is compared with the declining rates for loans, appear a profitable purchase, and likewise advance.

An increased demand for goods commences to be felt, and prices here and there are raised cautiously. This, perhaps, stimulates demand; the previous hand-to-mouth buying now, on a rising market, gives way to the placing of large orders. With the outlook for business profits thus improved, speculators commence to purchase lower grade securities. Stock market dealings broaden as the speculative advance gets under

way. *Improvement* has replaced depression. Enterprisers, encouraged by the low interest rates and the widening margin of profits, expand operations. New ventures, at first cautiously and then with confidence, are embarked upon.

When, as proves the case in most instances, the early investments and ventures result profitably, the public enters the stock market. Transactions become larger and more speculative in character. Commodity prices by this time have risen. Manufacturing output expands. Plant facilities are taxed. Much new construction is undertaken. Large inventories are carried by traders. More business is being done. *Prosperity* becomes more or less general. The funds once super-abundant in the banks, however, have by this time been heavily drawn upon, and interest rates commence to rise.

Where the demands of speculation and business for loans cannot both be met, banks discriminate against speculation. Stocks and bonds meanwhile have advanced until, their investment yield compared to the steadily higher interest rates charged for carrying them, they no longer appear attractive. Liquidation commences in the security market. Shrewd observers, moreover, note that costs of doing business by continuing to rise are encroaching on profits, and begin disposing of speculative securities. Business continues active, but evidences of unsoundness—ill-advised projects, unwieldy inventories, inflated prices, excessive credit—develop. Bank reserves decline. The more cautious business men commence to draw in. As trade creditors they, and the banks, adopt stricter credit policies, and press certain over-extended debtors for payment. *Liquidation* becomes general. Commodity prices fall as goods are thrown upon the market. Costs cannot be reduced as fast as selling prices decline. Losses are incurred. Business failures increase.

How drastic will be the decline depends largely upon the banking policy, more specifically upon the action taken by the Federal Reserve Board. Under the old inelastic banking system, liquidation often was panicky. Whereas the unusual deflation of 1920-21, guided by the Federal Reserve Board,

represented crisis, but no panic. Liquidation as it proceeds deflates commodity prices, costs of doing business, credits, inventories, and the ideas, as well, of business men. Bank reserves increase. Loans become easy to get. These conditions all pave the way once more for improvement.

CHAPTER V

STATISTICAL SERIES SORTED INTO GROUPS

Which Series Constitute a Group?

The above descriptive analysis indicates that certain important sequences of movement and groupings of series do exist. How determine more definitely what these are, and put them into use?

A method readily employed is to plot all the different series on cross-ruled paper similar in scale, and compare their appearance on the charts. By inspection one can discover with some accuracy which series fluctuate together and which do not. Likewise the closeness with which the former move together and the wideness with which the latter vary from each other, can be noted. See Figure 9, which illustrates this very well. In the next two chapters, where all the series are shown individually charted, this method is employed.

Degrees of Likeness Measured Statistically

While inspection by means of graphs proves convenient, there is a statistical method also by means of which the degree of likeness, or correlation, between statistical series can be expressed in figures.

Two series so related that fluctuations in one are in sympathy with fluctuations in another are said to be correlated. And the degree of this relationship between them is expressed by a coefficient of correlation. Should they move upward or downward exactly together, the correlation is termed perfect, and the coefficient of correlation expressing it is $+1.00$. On the other hand where two series move in opposite directions, a movement upward in one being accompanied by an equal movement downward in the other, or vice versa, the correlation is termed negative, in this case perfect negative correlation, the

coefficient being -1.00 . In case series move independently of each other, there being no relationship whatever between them, correlation does not exist and the coefficient accordingly is 0. Thus every possible degree of relationship, varying from $+1.00$ on through to -1.00 , can be expressed by a coefficient of correlation.

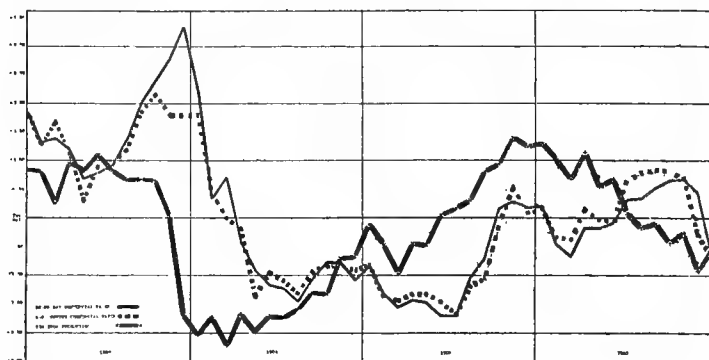


Figure 9: Interest Rates and Pig Iron Fluctuations Compared

Pig iron, a producers' good, an essential in manufacture and new construction, commenced to decline early in the summer of 1907, several months before the decline in commercial paper rates. The credit strain, in fact, grew more serious until the close of the year. Then, the liquidation in general business having been drastic, interest rates fell rapidly. The general course of money continued downward until late in the summer of 1909. Pig iron production meanwhile for over a year had been advancing. Prosperity during 1909 again reached high tide. Money rates upon the whole had been tightening, however; and business liquidation now commenced. Pig iron production here commenced to decline some ten months before money rates had touched their high point, and began to fall.

60-90 days commercial paper rates and 4-6 months commercial paper rates, it seems clear, fluctuate closely together, and hence can legitimately be combined. But pig iron, due to its unlike sequence of movement, cannot properly be combined with either.

In reasoning out all kinds of problems, the conception of correlation here presented proves extremely useful, even though the matters dealt with are not expressed in figures. It should underlie every person's thinking. The usual discussion of "cause" and "effect" represents merely reasoning in a circle, since the "causes" and "effects" discussed both act and react upon each other. Practically all factors in business are related to each other. But some of them, this idea of correlation or common sense teaches us, are more closely related than others.

These are the essentials, the factors we seek for and rely upon when forecasting the outcome.*

For measuring correlation, the formula devised by Karl Pearson is employed.† The commercial paper rates in Figure 9, for example, when the calculations called for by this formula were made, gave a coefficient of correlation of $+.961$, these two acting almost as one in their respective fluctuations. 60-90 day paper and pig iron, on the other hand, shown in this same figure, are correlated only to the extent of $+.190$. Both inspection and mathematical calculations thus agree, as they should, concerning the extent of relationship between these series.

Three Important, Yet Distinct, Series

Analysis made of the various statistical series, in which they are both inspected graphically and coefficients of correlation calculated, discloses three series, excellent barometers in each case but clearly unlike in sequence of movement. One occupies a middle position during the course of a cycle, one moves on ahead, one lags. On account of this unlikeness in movement or, putting it statistically, their low correlation with each other,

*In his notable *Grammar of Science*, Karl Pearson thus puts it:

"The subsuming of all the phenomena of the universe under the category of contingency rather than that of causation is one epoch-making to the individual mind" (3d. ed., p. 165).

"No phenomena are causal; all phenomena are contingent, and the problem before us is to measure the degree of this contingency, which we have seen lies between the zero of independence and the unity of causation" (p. 174).

"Actual experience of correlation shows that it is only a few highly correlated variables that matter. 'All causes' might mean the whole past history of the universe, and what would happen if the universe started afresh from the same initial conditions, nobody knows, nor will anybody profitably stay to conjecture

We learn that multiplicity is not essential to the approach toward high contingency, it may be as high with one as with the sum of twenty associated phenomena" (p. 173).

†The coefficient of correlation for two series can be computed by the formula here given,

in which r is the coefficient of correlation, the x 's the series of deviations from the arithmetic average of one series, the y 's the corresponding deviations from the arithmetic average of the other series, Σ the algebraic sum of the products of the x 's and y 's, n the number of items, and σ_1 and σ_2 the respective standard deviations of the two series. The standard deviations in turn are computed by the formula here given, in which d refers to the above mentioned deviations.

$$r = \frac{\Sigma xy}{n\sigma_1\sigma_2}$$

$$\sqrt{\frac{\Sigma d^2}{n}}$$

these three series should not be combined. To do so would blur the significance of each.

Pig iron production, stock prices, and interest rates, the three referred to, will each be taken as a base, therefore, with which additional series *like it* will be grouped. We build up, in this way, a dependable index, clear cut in its meaning.

Summary

Fundamental statistics as secured from government reports and other sources, it was pointed out on page 15, may be looked upon as raw materials. What different processes fit them for our use in forecasting? This question has now been answered. Summarized, the steps are:

1. Choose statistical series broadly representative and sensitive to change.
2. Eliminate long range growth, or the secular trend, from them.
3. Eliminate seasonal variations.
4. Reduce the fluctuations of all series to comparable terms, that is, per cents above or below normal.
5. Investigate the order in which the different series fluctuate, and sort into groups those moving in like sequence.

These processes having now been dealt with, we are ready to construct the Index.

CHAPTER VI

CONSTRUCTING THE INDEX

Maximum Benefit the Aim

Corrected and properly sorted statistics constitute a series of reliable reports on business. They provide information and positive advice of great value. How should these statistics be presented, that their meaning be clear and easily grasped? Printed in tables, item by item, their very number would overtax the mind; the meaning would be there but the average reader could not decipher it.

The method desired is that in which statisticians and statistical clerks do most, if not all, the hard grubbing, and the user of the finished product, in consequence, with minimum effort, derives maximum benefit from it. The Index which has been devised, we venture to believe, satisfies to a high degree these exacting requirements. Its make-up will now be described step by step.

This description, which extends to page 47, has been made brief and is set in smaller type also. Readers desiring to save time can note only the charts, quickly. Those concerned over forecasting as they ought to be, however, will read the text as well.

Normal conditions are taken as the base, or zero line, from which all statistical items are plotted. (See Figure 10.) This base line, the growth element having been eliminated from the various series, runs horizontal, from left to right.

Business, and Its Statistical Indices

In constructing the Index, let us commence with statistics on pig iron. Since this commodity enters into manufacture and construction work of every form, pig iron production increases or decreases very sensitively as changes occur in business. This sensitiveness and the basic character of

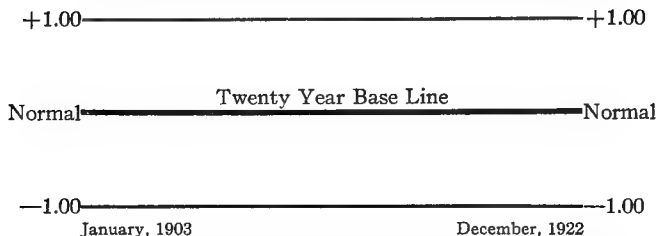


Figure 10: Base Line

To provide a dependable base for measuring current fluctuations, twenty years, rather than a shorter period, have been taken. This base line runs horizontal; it represents normal conditions. The extent of all fluctuations, both above and below it, will be shown in per cents. 100 per cent represents the average amount a statistical series has fluctuated monthly over the years 1903-21. Current percentages show how far a different series is above or below normal, compared with average difference from normal over the preceding nineteen years.

the iron and steel industry itself, render pig iron production an unusually good barometer of trade.

How pig iron production has reflected the trend of business since 1903 appears in Figure 11. The production figures have been corrected, of course, for long range growth and seasonal variation.

What other statistical series are in themselves excellent indices and fluctuate closely enough with pig iron so that they may be combined with it?

The amount of business being transacted, due to the general practice of making payment by check instead of passing currency direct from hand to hand, can be determined with reasonable accuracy from statistics on bank clearings. These are reported weekly by banks not only for the entire country but for various districts.* A considerable proportion of the New York clearings, however, arise from stock market operations, rather than general trade. Since New York's clearings constitute over half of all clearings, "total clearings" reflect trade conditions with more or less speculative bias. For this reason "outside clearings," by which is meant all bank clearings outside of New York, more accurately report the volume of business. They are used here.

With pig iron production and bank clearings, which reflect the *volume* of business, let us now combine a *price* index. Wholesale price statistics are collected by several organizations, notably the U. S. Bureau of Labor Statistics and Bradstreet's Commercial Organization. The latter includes

*Bank clearings do not include *all* checks drawn but those passed through clearing houses. The Federal Reserve System has changed in certain respects the handling of checks, but more important still, with respect to future use of clearings as a barometer of trade, is the action of the Clearing Section of the American Bankers' Association in recommending that customers' debits, rather than total clearings, be compiled and published. Cf. *Commercial and Financial Chronicle*, August 10, 1918, page 551, also "Destroying Records of Bank Clearings," *ibid*, March 11, 1922, pp. 988-93.

in its "index" 96 commodities, the current price per pound of each being combined for the final price, or index figure. Significant for our use is the fact that in comparison with other indices, Bradstreet's reflects more sensitively changes in business. No other commodity price index has proved so reliable for barometer purposes.*

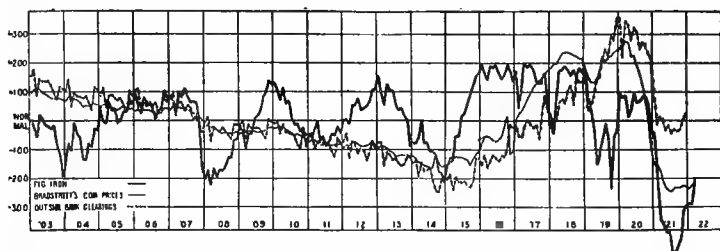


Figure 11: Pig Iron, Bank Clearings, and Commodity Prices

Changing conditions in Business—using this term here in the narrower sense in contrast to banking and security market operations—are reflected by these three series.

(On account of the war and conditions following it, commodity prices rose abnormally. Bank clearings, also, representing business transactions both large in physical volume and on an inflated price basis, mounted much above pre-war levels. In measuring the secular trend, therefore, these unusual war conditions render the "fit" of the line less close for the preceding period. See Figure 3, which indicates this clearly. A modified method, in which the influence of these abnormal conditions are reduced, will be employed in measuring the secular trend of these series, when the post-war trend has become more definitely established.)

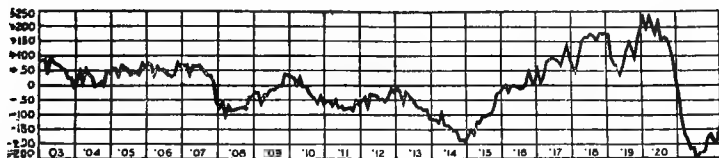


Figure 12: The "Business" Curve

This curve includes three series—pig iron production, outside bank clearings, and Bradstreet's commodity prices—in its make-up. In preparing it, the actual figures reported monthly have been statistically treated as follows:

1. The growth element, or secular trend, has been eliminated.
2. Seasonal variations have been eliminated.
3. All fluctuations were next reduced to a comparable basis.
4. The statistics of the three series, thus prepared, were then combined and plotted.

*The reason is that Bradstreet's index gives more weight to textiles, hides, leather, and provisions, items which fluctuate sensitively in the market. Upon investigating the action of different index numbers during 1891-'13, W. C. Mitchell found that in eleven of the twenty-three cases of changes from one year to the next the seven index numbers disagreed as to whether prices rose, fell, or remained constant, but that Bradstreet's made the best showing. *Ibid.* "Index Numbers of Wholesale Prices in the United States and Foreign Countries," *Bulletin of the U. S. Bureau of Labor Statistics*, Whole Number 173, p. 111.

These three series are plotted in Figure 11. The correlation between pig iron production and outside bank clearings is +.675; between pig iron and commodity prices +.407. Upon combining these three series, we have in Figure 12 the curve termed Business. On account of (1) the character of the three series—pig iron production showing conditions within the country's basic industry, bank clearings the volume of trade, and commodity prices the prices at which transactions are effected; (2) the sensitiveness with which they reflect changes; and (3) the degree of correlation between them, this curve provides a dependable Business indicator.

The Security Market, and Its Statistical Indices

The stock market by its trend of prices reflects the beliefs which large numbers of persons, possessing sound judgment and money, hold concerning the business outlook. Many of these men are corporation directors and officials, in close touch with conditions. Whatever the views they express publicly, in buying or selling stocks they never desire to deceive themselves. In the stock market men are risking money on their opinions, and they consequently try to foresee, and express as accurately as they can, such opinions. Better than interviews with these men concerning the business outlook, therefore, is the actual trend of prices in the stock market.

Various stock market averages have been constructed, which at certain periods no doubt reflected the action of the market as a whole very well. But speculation does not continue year after year centered in the same issues; it keeps shifting. The rails led the market in 1906, the war stocks in 1915; oil stocks and motor stocks during recent years have become prominent. Since none of the stock market averages available provides flexibly for this shifting of speculative interest, we have constructed an index made up each year of those twenty-two stocks in which transactions over the year have been the heaviest. While a few issues, such as U. S. Steel, hold their places among the twenty-two year after year, changes in the make-up of the averages are numerous; old speculative favorites at the end of each year are dropped as new favorites are taken up.* Because of this method of

*In 1921 these stocks were included: American International, American Woolen, Atlantic Gulf, Baldwin, Bethlehem B., Chandler, Crucible, Famous Players-Lasky, General Asphalt, General Motors, Mexican Petroleum, Middle States Oil, Northern Pacific, Pan-American Petroleum, Reading, Sinclair, Studebaker, Texas Company, Texas and Pacific Coal and Oil, United Retail Stores, U. S. Rubber, and U. S. Steel.

These 1921 issues will be employed during the current year, and when at the close the records have been compiled showing what particular issues were more active than any of the foregoing, substitutions will accordingly be made, and the averages of 1922 thereby revised. The list of issues thus revised will then be used during 1923.

The new issues added at the end of a year are not the same in price as those displaced, hence the averages for a given year are compiled also for January of the year following and the percentage which the new averages for this same month bear to them is computed.

selecting the issues, the market itself being allowed, as it should be, to determine the matter, our index of twenty-two speculative stocks represents the most sensitive index of stock price changes.

While over a period of years stock prices run true to form in reflecting the cycle, technical market conditions at times render them erratic and uncertain as a guide over short periods. Bond prices here possess a certain superiority, since they are free very largely from manipulative influences. But gilt-edge bonds reflect rather the outlook for money than that which concerns us more, the outlook for profits in business. Hence we have constructed a bond index, also, one based upon the same principle as above, twenty-two industrial bonds in which the largest volume of transactions occur.* Speculative issues, these are, in the main.

With these stock and bond averages, which indicate price, let us combine now New York bank clearings which represent volume. Included in these clearings, of course, are general business transactions but so pronounced do security transactions center here that New York bank clearings fluctuate primarily with them.†

Were last year's issues \$104.50, for instance, and this year's \$95, the latter would be multiplied by 110 per cent, and so on during the remainder of the year.

While the method of having speculators themselves select the issues would, one might at first believe, result in stock averages much under par, by giving undue weight to issues low in price, the averages actually secured, both originally and after being adjusted with preceding averages, generally have run not far from \$100.

An issue listed during the year occasionally becomes active enough to get into the list of 22. Quotations for the earlier months of that year were then interpolated by finding the percentage which its price the first month available bore to the most active issue and multiplying earlier prices of the latter issue by this percentage. Were more than one new issue thus introduced, prices of issues next in order of activity would be employed. This method of interpolation has the effect of giving the more active issues additional weight.

For the period when the New York Stock Exchange was closed in 1914, unofficial quotations have been taken from the *Financial Review*, 1915, pp. 157-61, for October and November; and averages for August and September interpolated by stepping down uniformly the decline between July and October. The same method was adopted with the bonds except that here, quotations for four months lacking, the decline between July and December was stepped down uniformly.

*In 1921, these bonds were included: Am. Ag. Chemical 1st ref. s. f. 7½s 1941, Am. Sm. & Ref. 1st. 5s 1947, Atlantic Fruit Co. cv. deb. 7s 1934, Atl. Ref. 10-yr. g. deb. 6½s 1931, Cerro de Pasca 10-yr. s. f. conv. g. 8s '31, Chile Copper col. tr. 6s conv. 1932, Cuba Cane Sugar Co. 7s 1930, Cuban-Am. Sugar 1st col. s. f. g. 8s '31, Du P. de N. 10-yr. g. 7½s 1931, Goodyear T. & R. s. f. 8s 1941, Int. Mer. Mar. 1st s. f. 6s 1941, Kelly Springfield T. 10-yr. 8s 1931, Mexican Pet. 15-yr. s. f. cv. 8s 1936, Midvale Steel & Ord. col. tr. cv. 5s '36, Packard Motor 10-yr. 8s 1931, Sinclair Oil conv. 7½s 1925, S. O. of Cal. 10-yr. deb. 7s 1931, U. S. Rubber 1st & ref. 5s 1940, U. S. Rubber 7½s 1930, Va. Caro Ch. 12-yr. s. f. 7½s 1932, Westinghouse El. Mfg. 7s '50, Wilson & Co. 1st s. f. 6s 1941.

Methods identical with those for stocks were employed with the bonds.

†The introduction of the Federal Reserve Clearing System has influenced the value of New York clearings, but the clearings have also been affected, and more strongly so, by operations of the New York Stock Exchange Clearing House, which began April, 1920. Very possibly, therefore, New York clearings will later be dropped from our Index, though at present they appear significant enough to be included.

These three statistical series are plotted in Figure 13. The correlation between stock prices and bond prices is $+.684$; between stock prices and New York clearings $+.480$. The security market curve, shown in Figure 14, fluctuates very sensitively with changes in the cycle. Its importance for forecasting use, however, lies in the fact that fluctuations upward or downward in the Security Market curve *precede* those of the Business curve. This matter, the general significance of which has already been pointed out, will be considered further later on.

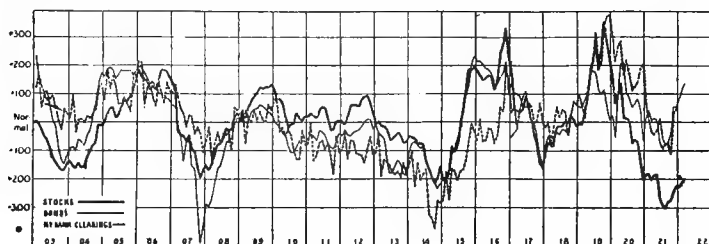


Figure 13: Stock Prices, Bond Prices, and New York Clearings

Stocks are represented by average prices of the twenty-two issues most heavily traded in during a given year. The make-up of this stock average thus varies as speculation shifts from certain issues to others. Bonds are represented by twenty-two industrial issues, selected and averaged in the same way.

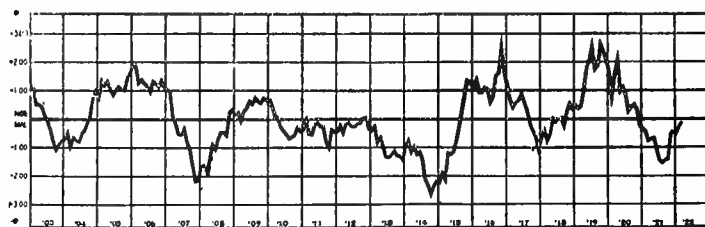


Figure 14: The "Security Market" Curve

This curve includes three series—stock prices, bond prices, and New York bank clearings—in its make-up. In preparing it, the statistical methods already described have been employed. On account of the way constructed, this curve reflects conditions in the security market very sensitively.

The Money Market, and Its Statistical Indices

Almost all business and security transactions are carried on by means of credit. Credit has come to be, in fact, the life blood of commerce. The circulation of credit is directed by banks, in part by granting or refusing loans in favor of one customer or business purpose as opposed to another, but more generally, and effectively, through raising or lowering interest rates.

In determining when to raise or lower interest rates, and how much, bankers consider carefully, needless to say, the amount of their reserve, the ratio of loans to deposits, and similar items upon which a bank's position depends. So far as the relative proportions among them is concerned, these items have been influenced markedly by the introduction of the Federal Reserve System. Though the banking system has been improved, the use of such items over a period of years in forecasting, has been made less satisfactory.

The customers of a bank are, however, less directly concerned with its condition, provided only that it is sound, than they are with the interest rates charged them for loans. While certain funds, to be used for buildings, machinery, or other fixed investments, are wanted for relatively long periods, the great bulk of credit provides for the financing of short term transactions. Mercantile credit, this is termed. It is used by manufacturers, wholesalers, commission merchants, retailers and others for carrying commodities, while these are on their way to the ultimate consumer. Securities—which represent fixed capital in industry—in considerable volume are also carried on short term credit, either indirectly through brokers or directly by investors, who obtain bank loans secured by collateral. All mercantile loans, commonly referred to as commercial paper, run for relatively short periods.

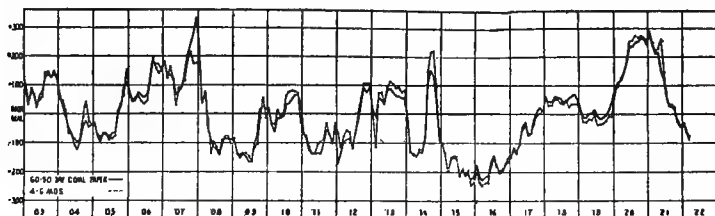


Figure 15: Commercial Paper Rates

The "Money Market" curve includes two series—60-90 day commercial paper and 4-6 months commercial paper—in its make-up. Both rates have been here plotted. It does not appear necessary to show as an additional chart the curve combining them, since the two series move almost like one.

Interest rates on commercial paper, as they vary, reflect changes in banking, or, more strictly speaking, in the money market. Quotations for choice-double name commercial paper running 60 to 90 days have, therefore, been compiled. See Figure 15. The second curve shows the quotations for good single name commercial paper running 4 to 6 months.

The two rates, as would be expected, fluctuate alike to a high degree. The correlation is $+0.983$, not far from perfect. When combined, these commercial paper rates constitute the Money Market curve.

CHAPTER VII

CONSTRUCTING THE INDEX

(Continued)

Agriculture and Mining; Their Statistical Indices

The great bulk of business activities are concerned, directly or at one or more steps removed, with raw stuffs, commodities such as wheat, live stock, coal and copper. Those providing such raw materials are not the only real producers, of course, for the manufacturer who mills a carload of grain and the chef who uses a portion of this flour in preparing a dinner produce quite as truly as the farmer who grew the wheat. Nevertheless, raw materials are the first link in the physical processes of production. They give employment for over half the country's total population, provide traffic for the railroads, influence the general cost of living to a marked degree, and determine directly the farmers' and miners' ability to purchase manufactured goods. When abundant, or in deficient supply, agricultural and mining products exert upon all later business operations a stimulating, or depressing, influence.

An index which overlooks agriculture and mining cannot be considered workably complete. We must devise means, accordingly, in constructing the Index, to fit raw material statistics into it.

The raw material statistics secured cover ten important commodities, as follows:

- | | |
|-----------------|--------------------|
| 1. Winter wheat | 6. Bituminous coal |
| 2. Spring wheat | 7. Anthracite coal |
| 3. Corn | 8. Petroleum |
| 4. Oats | 9. Copper |
| 5. Cotton | 10. Zinc |

Crop statistics are issued at stated intervals by the Bureau of Markets and Crop Estimates, U. S. Department of Agriculture, in which the condition of each of the above five crops is shown by a percentage of "normal." These percentage figures, consequently, do not have to be corrected for long range growth and seasonal variations. The mining statistics have been corrected for growth, which is pronounced in the case of all five items; but not for seasonal variations, since monthly data covering a sufficiently long period cannot at present be had. Figure 16 presents all ten series.

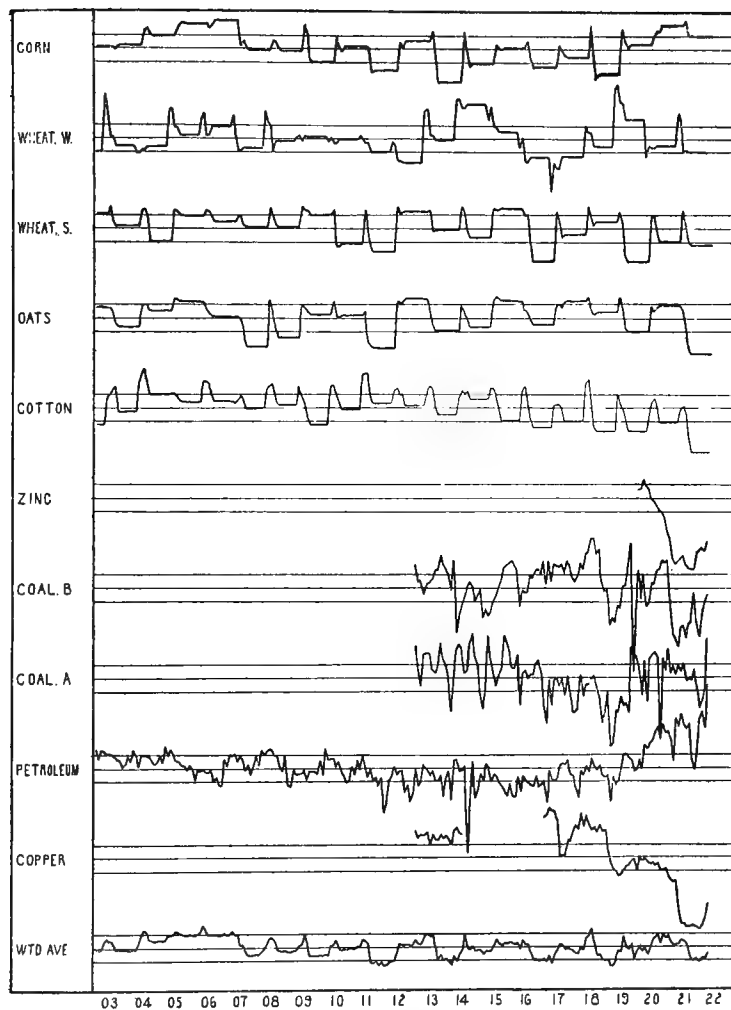


Figure 16: Agriculture and Mining

Statistics of ten leading products have here been combined to form the "Agriculture and Mining" curve at the bottom. All statistical series have been reduced to a comparable basis, as heretofore, and in plotting each the middle line of the three horizontal lines represents normal, that above $+1.00$ and that below -1.00 .

The single curve at the bottom represents them combined, each series being weighted according to its relative importance.*

More than other commodities, grain crops depend upon elements outside human control—weather conditions more particularly. Some investigators, as Professor Moore, believe that cycles in business are due at bottom to favorable, or unfavorable, weather conditions. An interval of one or two years is required, however, before good or bad crops produce their maximum effect upon industry. Statistics on raw materials, for this reason, while decidedly significant, lack sensitiveness.

The "Agriculture and Mining" curve shows the changing volume of raw materials introduced into industry. Such changes are fundamental, though not immediate in their effect.

Manufacture and Transportation; Their Statistical Indices

Industry, making use of the raw materials of agriculture and mining, provides for the wants of ultimate consumers. Cotton must be woven into cloth, cattle slaughtered, leather tanned, timber sawed into lumber. And all these products have to be transported here and there where wanted. Like agriculture and mining, manufacture and transportation employ millions of persons and capital. Increases or decreases in the volume of physical production accordingly are significant.

What statistical series, among those available, best picture for us these widespread manufacturing and transportation activities? Only within recent years have monthly figures on the most important industries been collected, hence much remains to be desired. Nevertheless, making use

*The basis upon which the weights have been devised is the values given by the *Thirteenth Census*, 1909. Winter wheat represents 10.0 per cent, spring wheat 5.2, corn 34.9, cotton 17.1, oats 10.1, bituminous coal 10.4, anthracite coal 3.6, petroleum and natural gas 4.5, copper 3.2, and lead and zinc .7, of the total 100 per cent.

As shown in Figure 16, monthly data became available for certain of these series only some time after January 1, 1903. Where one or more of the ten was lacking, the above per cents were increased *proportionately* to make up the 100 per cent required for the final curve.

Crop estimates are issued at stated intervals but not monthly, hence commencing with the first spring report the percentage figures of each report were carried forward monthly until the next report had been issued. Under this plan the figures of the final report on each crop issued at harvesting time, which is the most important as well as most accurate, are made use of during several months.

The winter reports on next year's crops were not used. Cf. Moore, *Forecasting the Yield and the Price of Cotton*, pp. 74-5. New *Crop Report Regulations* became effective January 1, 1922, as per announcement of the Secretary of the U. S. Department of Agriculture.

With petroleum, monthly statistics for the entire country were not available over the full period, but reports on the Appalachian field, both monthly and annually, were. Interpolations were made by finding the per cent which Appalachian production for a given year bore to the entire production for that same year, and raising the monthly Appalachian statistics accordingly.

of what is to be had, we select production statistics of the following ten commodities as representative of manufacture:*

- | | |
|------------|--------------------------------------|
| 1. Lumber | 6. Steel |
| 2. Leather | 7. Cattle slaughtered |
| 3. Tobacco | 8. Hogs slaughtered |
| 4. Paper | 9. Wool consumed in manufacturing |
| 5. Coke | 10. Cotton consumed in manufacturing |

The growth element has been eliminated from these series, with the exception of lumber and paper the annual data for which series cover only a short period. Monthly data for all items cover too short a period to permit trustworthy seasonal variations to be computed. This is much regretted, since certain series, such as cattle and hogs slaughtered, have pronounced seasonal variations. Figure 17 presents the various series.

For physical volume of transportation, statistics on freight car loadings are highly satisfactory. These are compiled by the American Railway Association and published weekly. While on account of the limited period available they cannot be corrected, freight car loadings notwithstanding are a valuable barometer.

Freight car loadings are assigned a weight of twenty-five per cent and the various manufacturing series the remaining seventy-five per cent according to the relative importance of each, in constructing the "manufacture and transportation" curve shown last in Figure 17. Movements up or down in this curve picture with considerable accuracy the changes taking place in industrial output.

*These items have been weighted according to the value *added by manufacture*, as shown by the *Thirteenth Census*, 1909. Value added by manufacture appears more significant than value of product, since in some instances, such as meat packing, most of the latter represents raw materials. Lumber accordingly has a weight of 23.3 per cent, leather 2.9, tobacco 8.6, paper 3.7, coke 1.1, steel 14.4, cattle slaughtered 2.5, hogs slaughtered 3.5, wool consumed 5.5, and cotton consumed 9.2, of the 75 per cent assigned the ten products; and freight car loadings 25.0, making the total 100 per cent.

Complete monthly data from January, 1903 are not available, as Figure 17 indicates. Later where some of the series were lacking, the above per cents were increased proportionately to make up the 100 per cent shown by the final curve.

The production statements available do not, however, cover each industry fully. Not even Census returns do that, and these moreover become available only at five year intervals; whereas for our purpose *monthly* statistics are needed. Representative, rather than complete, production statistics must accordingly be used. The lumber industry, therefore, is represented by sawings of southern pine, eastern white pine, North Carolina pine, western pine, and douglas fir; leather by sole leather; tobacco by large cigars; paper by wood pulp, newspaper, book and wrapping paper; coke by bee-hive; steel by steel ingots; and cattle and hogs by slaughtering at principal centers under Federal inspection. All these statistics, including those cited above, are taken as *samples* of industrial production.

Many difficulties are encountered in working out a monthly index of manufacturing production over a period of years, as one who undertakes it appreciates only too well.

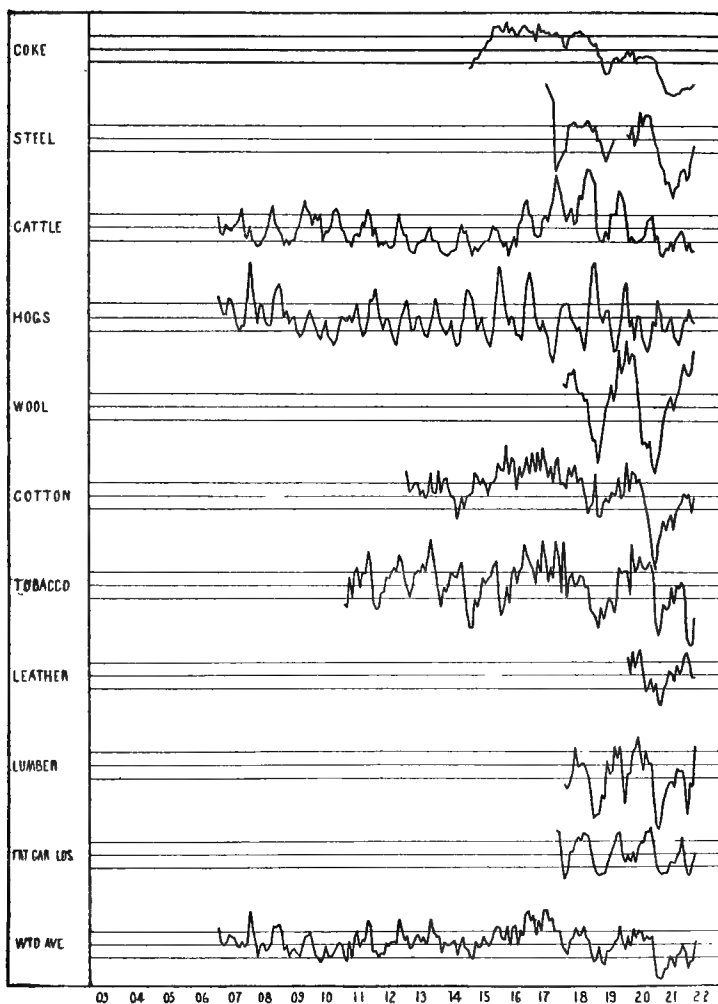


Figure 17: Manufacture and Transportation

Statistics of ten leading industrial products, together with freight car loadings, have been combined to form the "Manufacture and Transportation" curve at the bottom. Paper, a less important series, on account of limited space has not been shown but its statistics are included in the final curve. As in Figure 16, the middle line of the three horizontal lines represents normal for each series, that above $+1.00$ and that below -1.00 .

A. B. A. Index, in Completed Form

Our various statistical series, twenty-nine in all, sorted into five groups, will now be combined into a single Index. See large chart inserted on page 48. The Security Market, Business, and Money Market curves, upon which one relies chiefly in forecasting, occupy the central portion of the chart. Volumes of physical production, in agriculture and mining and in manufacture and transportation respectively, appear upon a reduced scale, at top and bottom. The description of its make-up being thus concluded, how does the Index prove its value in practical use?

When reasoning over the business outlook, a person needs facts, upon which he can rely, concerning these fundamentals:

1. What is the situation now as to raw materials? securities? interest rates? business? manufacture and transportation?
2. In which direction is each group moving?
3. How rapidly is it moving?

Upon examining the Index, we find it answers these essential questions definitely. One secures from it, in other words, a comprehensive grasp of general business conditions, in form available for forecasting.

The next chapter explains more specifically why this is so.

AMERICAN BUSINESS ASSOCIATES

INDEX

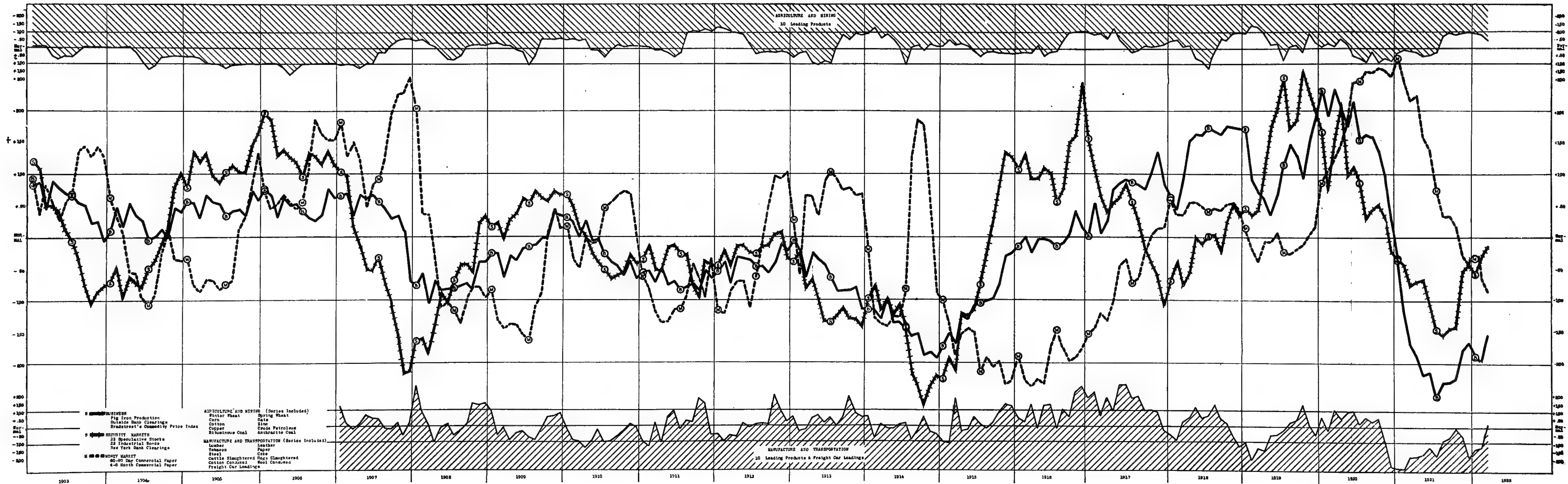
IN COMPLETED FORM

AMERICAN BUSINESS ASSOCIATES

INDEX

FUNDAMENTAL STATISTICS COVERING BUSINESS, THE SECURITY MARKET, THE MONEY MARKET, AGRICULTURE AND MINING, MANUFACTURE AND TRANSPORTATION

Monthly data. Twenty-nine series. Figures as reported treated statistically for use in forecasting



This Index shows graphically: (1) The position of securities, business, interest rates, raw materials, manufacture and transportation—compared with normal. (2) The trend or direction being taken by each. (3) The speed at which each is moving. This essential summary provides very quickly a comprehensive grasp of general business conditions, up to date, and in form available for forecasting.

CHAPTER VIII

HOW THE INDEX PROVIDES INSIGHT INTO BUSINESS

Where Business Takes a New Trend

The grasp of the business situation which the Index provides one becomes more evident upon considering concrete cases. These cases are not described as examples of how to forecast, however, a matter reserved for the next chapter, but for showing how the Index provides insight into business.

In forecasting, that which proves more difficult as a rule but which also contains greater possibilities of profit, is to decide when the trend of business conditions makes a distinct change. Knowing definitely even two or three months ahead of the rank and file that business during prosperity has commenced to slump, or after a depression has turned the corner toward improvement, gives a person decided advantage. Hence the two cases here chosen represent changes of this type.

Case Number One

The business situation once stood as shown in Figure 18. While in actual forecasting we would know what had occurred previously, which led up to this situation, here such knowledge is denied us. But Business (at -1.83) and Securities (at -2.37) were greatly depressed. Money (at $+0.69$) was high, though the banks were evidently under less strain than business and the security market. The general position at the opening was abnormal, one out of balance.

A situation out of balance may, of course, grow worse before movement in the opposite direction sets in, but, notwithstanding, the tendency always is toward normal and the farther from normal the position becomes at any given time the more likely a movement toward normal will set in.

Interest rates the next month dropped with unusual rapidity,

until much under normal. Business became somewhat more depressed. There being little demand for money in trade and industry, idle funds were accumulating at the banks. With interest rates low, and getting lower, investors could buy bonds and dividend paying stocks which sold upon a higher yield basis, and which in addition could be depended upon to rise so long as money remained thus easy. Far-sighted speculators, looking ahead to conditions several months distant, decided that corporation earnings would improve, and commenced in consequence to buy stocks. The Security curve, in the midst of this general pessimism, commenced to move upward.

These evidences that the bottom of the depression had been reached and an upward trend had set in were confirmed by later changes in the Index. Money continued to fall, until it became exceptionally easy. A bull move developed in the security market. And business gained momentum steadily. The outlook, as the period covered by Figure 18 closed, was strongly for improvement, which might later develop into prosperity.

Most readers recall this period very well, the twelve months from November 1914 to October 1915. The author remembers attending a meeting of the Economic Club held in April 1915 at which various speakers expressed grave doubt concerning the outlook, none of them offering positive encouragement for taking hold. The Index then, however, has been showing dependable evidence of improvement for some three or four months.

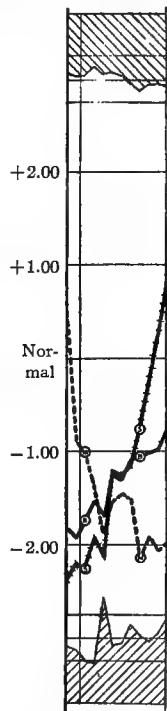


Fig. 18

Case Number Two

At another time, the situation shown in Figure 19 prevailed. Times evidently were prosperous. Business (+1.29) was at

high tide, and during the early part of this period continued to expand. Securities prior to the period covered by the figure had evidently been advancing (now standing at $+1.85$) and a bull market was under way. Money conditions, while not exactly encouraging, were at the outset easier than normal.

Upon surveying the position shown during these early months, what conclusion would a prudent man draw? Prices were high, costs were high, physical production had soared, but considering the figures calmly the situation clearly was out of balance, seriously so. Regardless of the general enthusiasm, the conservative man would conclude that a readjustment was about due and would commence to draw in.

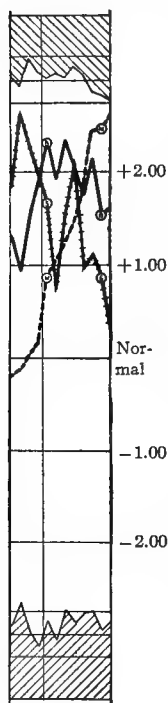


Fig. 19

Noting the evidence which later developed, the changes shown in the different statistical groups, he would become more firmly convinced of this. Business meanwhile attains unusual height; $+2.33$ is reached the fifth month and $+2.37$ two months later. But Securities having reached their high point of $+2.61$ during the second month, turn downward. Whatever may be claimed of later corporation profits, and stock dividends, shrewd holders of stocks and bonds were selling out. Money conditions have been growing worse, and by the pronounced rise in interest rates reflect the strain which develops in banking, which only liquidation can relieve. While Business holds up well for several months, the credit strain becomes more pronounced. During the latter portion of the period covered in Figure 19, interest rates become almost prohibitive. A bear market now has gotten under full headway on the exchange. And liquidation of Business at length sets in.

This period shown in Figure 19 covers the twelve months September 1919 to August 1920, a period of drastic liquidation

fresh in the minds of most managers and investors. More reliable than opinions current at the time, it appears clear, the Index early gave warning of the readjustment which, once it commenced, did not end until the summer of 1921.

Practical Diagnosis of Conditions

The way the Index provides insight into conditions, concrete cases having been given, will now be outlined more broadly.

The current situation in trade and industry can be determined by examining the Index, the final point of the curve termed Business and, supplementing this, the curves of Agriculture and Mining and of Manufacture and Transportation. These summarize data drawn from twenty-four different sources, covering practically every important phase of business, using this term in its narrower sense. Not only can the present position thus be readily seen, but the direction of the movement during recent months toward this position, and the rapidity of the movement itself, clearly appear.

Cross-comparisons of Business with Securities and the Money Market are next undertaken. Use will be made here of the significant matter already pointed out, that securities and interest rates in comparison with business move in a different sequence.

How Stock and Bond Prices Assist in Forecasting

Stocks and bonds are always being combed over by persons ready either to buy or sell them, if they are considered below value, or above value. Value from the investment standpoint depends upon the interest or dividends paid by a security *after* purchase, and from the speculative standpoint upon *later* advance or decline in price—set over against the interest charges *to be* incurred while carrying the security. Future prospects, therefore, in the long run govern the course of security prices. Persons dealing in the security market, and making a profit, seek constantly to forecast these prospects.

Those more able in making such forecasts earn a larger percentage on their capital. Gradually they acquire a more im-

portant place in business, as corporation officials, directors, managers of banks, promoters and financiers. Positions of this sort, in turn, provide those holding them a wider outlook over profits and more intimate personal relations with associates equally, if not better, informed. Superior foresight represents perhaps the most fundamental characteristic of men thus placed and trained.

Such far-sighted persons are willing, in the midst of a depression, to commence buying securities early, while most persons still see nothing but dark clouds ahead. They likewise, during prosperous times, begin to sell out before the rank and file become aware of the approaching liquidation. Movements upward or downward in security prices, for this reason, tend to precede changes in business.

Credit's Influence Upon Securities and Business

Superior foresight in estimating future corporation earnings, the main reason no doubt why security prices move on ahead of business, is reinforced, however, by other influences. Once having decided that a slump is due, for instance, a speculator can liquidate his securities, and in addition sell short if he chooses, more quickly in general than a business executive can change his company's building plans, cancel orders for goods already placed, reduce inventories, and otherwise draw in. Credit conditions represent another, and much more important, influence.

When money strain during a boom commences to develop, the banks by discriminating against speculation in favor of business induce liquidation, and consequent decline of security prices before business. Stiffening rates for money and the ease with which securities may be liquidated, thus leads persons possessed perhaps of no unusual foresight to throw securities on the market and continue operations in business, which still remains good. Likewise, following a period of liquidation, money first becomes easy in Wall Street through the practice of country banks in sending a portion of their cash to New York banks, to be lent on call. Their local customers would pay

more than Wall Street does for this money, but country banks must keep a part of their funds thus liquid. While business men are thawing out their frozen assets, therefore, and getting into shape, investors and speculators may with these otherwise idle funds start an advance in the security market.

Banks, The Reservoir of Loanable Funds

The supply of loanable funds, and the flow of such funds to and from the banks and their customers, influence at every step—it appears evident—the trend of conditions, more specifically the sequence in which securities and business move.

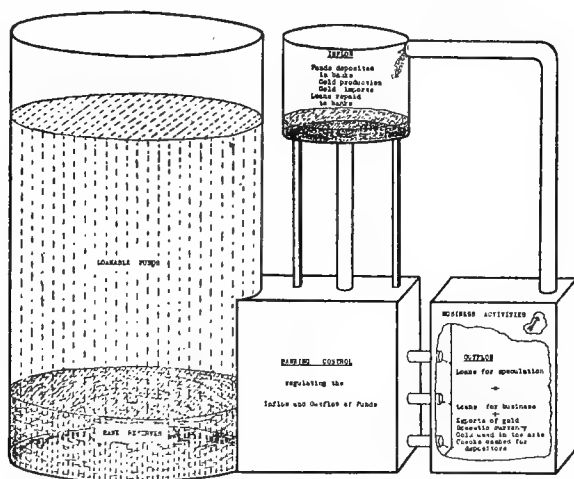


Figure 20: How Funds Circulate Through Banks

Loanable funds, based upon reserves, are shown at the left. The flow into this credit reservoir and out of it, is regulated by the banks.

This circulation of loanable funds may be rendered more clearly evident by a diagram. See Figure 20. The banks constitute a credit reservoir. Into this reservoir funds are pumped continually—gold being received from the mines and imported from other countries, deposits made by bank customers and repayments made by borrowers. Reserves thus accumulate, upon which banks may loan with safety a considerably larger

amount. Since making loans represents their real source of income, they do this.

The credit reservoir is tapped by three pipes, through which funds are drawn out. Over one of these pipes (that placed lowest in Figure 20), the banks have less control; gold needed for domestic currency, export or the arts has to be supplied when there is demand for it, depositors' checks must be cashed. When loans for business or security market purposes are applied for, however, bankers exercise a more definite control.

Toward the end of a period of liquidation, loanable funds have become abundant; but, since the flow into business remains at a minimum, banks loan to speculators and investors at low rates.

After a time, business improves and the flow of funds into it commences to expand. The supply of loanable funds, thus drawn upon, begins to decrease. And the banks, in order to husband their resources for business borrowers, raise their interest rates and discriminate against loans for security market operations. But the demand for loans as business continues to expand increases until banks, their reserves depleted, raise interest rates further and discriminate also among their business customers. Liquidation in securities and in business means repayment of loans, and a rise once more in the level of the credit reservoir.

CHAPTER IX

WHAT GOOD FORECASTING IS

Business Insight Based Upon the Essentials

Movements in business conditions, either upward or downward, are produced by powerful economic forces. The descriptive analysis presented earlier on pages 28-30 and carried further in the last chapter, have shown what these forces are, in nature, and how they continually act and react upon each other during the cycle. Some suggestions on how to put these facts and significant relationships more readily into use, when dealing with current statistics, will now be made.

There are three main angles from which forecasting in practice may be approached, that of the business manager, the investor, and the banker. Let us consider the business manager's problem first.

Business Manager

What is the outlook for Business?

The Security curve, because of reasons pointed out, regularly moves on ahead of the Business curve. Throughout the twenty year period covered by the Index, almost without exception (see page 48), the Security curve has forecast every important change in Business.

Securities in January 1903 stood above Business but rapidly dropped lower, during the bear market. Later by several months Business commenced to slump, and remain depressed well into 1904. Securities, however, touched their low point in 1903, and had been advancing several months before Business also began to recover. Once prosperous again, Business continued at full tide well into 1907, whereas Securities made top early in 1906 and turned downward, indicating later panic

conditions. The action of Securities and Business during later cycles, upon the whole, has shown the same characteristic features as during the above cycle.

Movements in the security market usually, though not invariably, forecast changes in business by some three to five months.

In forecasting the later trend of Business, making use of the Security curve, the business manager raises these two questions:

1. Can securities continue to advance? If so, this favors an upward movement in business.
2. Will securities decline, in a major move? If so, there will be a falling off in business later.

The Money curve, by its movement upward or downward, reveals the condition of the banks, their supply of loanable funds.

An advance in the security market and in business consumes loanable funds, obtained from the banks. Starting with depression, this advance usually continues for some six to ten months before, their reserves appreciably drawn upon, banks by raising interest rates send the Money curve upward. See Index on page 48. On the other hand, as the security market and business move downward, during liquidation, borrowers for a time urgently demand loans, in an effort to tide themselves over. The downward movement in business usually runs from six to ten months before, the strain in credit relieved, the Money curve follows.

Loanable funds represent the gasoline of industry. And much as a motor car driver, no matter in how good repair his car nor ambitious himself, knows the outcome when his supply of gas commences to run low, the business manager considers, in estimating the industrial outlook, how much credit is available, and what it will cost.

1. Are banks in position to lend freely? If so, this favors an upward movement in business?
2. Must banks curtail their loans? If so, liquidation of business is in prospect.

While raising the above questions concerning securities and

money, our business manager has also been noting carefully the industrial situation, his major interest or specialty. The information drawn from this source will doubtless be more complete. Assembling the data from these three sources, he estimates, in more or less detail, the business outlook:

1. Will business move upward?
2. Will business decline?

Investor

What is the outlook for
Securities?

Banker

What is the outlook for
Interest Rates?

The investor and the banker, like the business manager, each wants to determine the outlook within his own field. In the brief sketch above, presented in very general terms, the business manager raised certain questions. When forecasting the outlook for securities, however, does not the investor *from his angle* make use of the same data? Does not the banker *from his angle* also raise these same questions? Such is the case.

Investors, though directly concerned with securities, can forecast the market's future trend only by reasoning from business and banking, in addition to the market itself. For business data deal with the net earnings of companies and banking data with the cost in interest for carrying securities—the two factors which practically alone in the long run determine security prices. Bankers, directly concerned with loanable funds, can estimate the outlook for such funds only by forecasting the demands from business and the security market, where the funds are used.

Any one of these groups, it now appears evident, provides a basis for forecasting movements in the others. Because securities, business, and money are inter-related, acting and reacting upon each other, and we know what these inter-relations are, reasoning based upon them *individually* and in *combination* becomes possible. Good forecasting makes constant use of this fact.

Special Considerations Which Arise

In presenting clearly cut the factors and relationships essential for forecasting, the Index provides one, it seems reasonable to say, a penetrating insight into conditions. Were all cycles to unfold in the same order, or very nearly the same order, nothing further would be required. But each cycle to a certain extent is new. As the frontispiece chart, "The Course of Business over a Half Century," indicates clearly, it does not unfold exactly like preceding cycles, but presents features peculiar to itself. The Business curve in 1921 reached bottom a month earlier than the Security curve, for instance. The long decline in Money was halted by an exceptionally sharp, though temporary, rise in 1914, at the outbreak of war. In all cycles, reactions from time to time interrupt the main trend.

It is easy to overestimate the importance of these special features. More likely than not they represent news items, which are featured widely in the papers, whereas no attention is drawn to fundamentals, of far more importance which perhaps remain but little changed. Each new cycle, therefore, appears more or less disguised. Stripped to the essentials its similarity to preceding cycles becomes apparent.

At the same time, certain differences, new features which should be taken into consideration, do keep coming into the situation, affecting the outlook. Such special considerations are, of course, exceedingly numerous; though most of them fall under one or more of these heads:

Outbreak or termination of wars.

Important political elections.

Legislation economic in character, as the tariff or taxation.

Court decisions on important business questions.

Strikes and labor disputes of wide-spread nature.

Political or semi-political policies, such as currency inflation, deflation, or Federal Reserve management.

At the time of making a forecast, some of these special factors are clearly apparent, and their influence can be calculated. Others are present, but not well recognized, perhaps not detected. And certain others will not yet be knowable. As

the situation develops, therefore, new factors entering and old factors being changed, one's conclusions concerning the outlook are to be modified accordingly.

American Radiator Company's Experience

All lines of industry, which are combined in general business conditions, do not advance or decline together. Leather, textiles, and lumber broke early during the last liquidation, some time before iron, steel, and coal (see the charts on pages 43 and 46). Copper production recovered slowly from the recent depression whereas petroleum after a relatively slight decline quickly reached higher levels than before. Motor car establishments vary much more in their volume of business than do public service corporations, particularly those which supply homes rather than industry. These are typical of special differences which exist, from business to business.

"Every business has its peculiarities," observes President Woolley of the American Radiator Company. "Every business man will need his own statistics and his own set of charts to guide him. I don't mean he will need statistics that he gathers himself, but particular sets of statistics that he can get from recognized sources, and upon them, after careful study, he will base his judgment.

"During the last twenty years the American Radiator Company has weathered several periods of business depression and one severe panic—1907—and in the midst of the present depression is having the biggest full season in its history. Its growth has been constant. We attribute these results in principal measure to our having consciously operated under the principles of the business cycle. We chart business and financial conditions, keep our charts up to date, and make plans and conduct our business according to the situation as shown by interpretations of these charts.

"In this company, we lean with particular weight on our charts of pig iron prices, building material prices, building permits, interest rates, and strikes in the building trades." These items, the officials of this company have learned, enable

them best to forecast raw material costs and the demand later on for heaters and radiators.

Westinghouse Electric's Experience

The President of Westinghouse Electric and Manufacturing Company, E. M. Herr, says: "I watch the steel industry closely and plot its activities in the form of curves. These curves, I have found from experience, parallel with surprising exactness curves of our own activity of two, three, or four months later.

"Why activity in the steel industry is such an accurate and reliable barometer for us is not difficult to explain. A contraction in business activity means a general slowing down of construction. This has an immediate effect on steel, which suffers from a cancellation of orders, while structures already started are completed and require electrical equipment. That is why our business holds up for three or four months after the steel business commences to decline. Parallel reasoning shows why our business is slower in picking up than is that of steel manufacturers."

Many corporations are plotting on curves their records of sales, production, pay roll, inventory, raw material prices and other important items, often in considerable detail. Few so far have taken the next step, that of working out the significant correlations between general business and their particular operations. This represents a fruitful field which more and more managers will commence to cultivate.

In practice, therefore, good forecasting covers: (1) General business conditions; (2) The particular industry in which one operates; and (3) One's own establishment. An establishment really independent, however, as was pointed out on page 0, does not exist. All companies are members of one body, subject to common influences. Movements upward or downward in general business conditions, therefore, are fundamental. Sound insight into such conditions and knowledge of movements in them before they occur, furnish the most reliable one guide in directing a business.

Right, and Wrong, Conceptions of Forecasting

The methods of forecasting explained here have proved their value to the author, in practical use. And he presents them in the belief that other business men will derive benefits also from them. Some labor and close reasoning, it is true, is necessary to put these methods into use. But there certainly is nothing uncanny, nor far-fetched, about them. Good forecasting means, in fact, that common sense is at work, provided with the tools needed for dealing with complex and changing conditions.

This seems quite a matter of course. But wrong conceptions of forecasting, and of the means employed in forecasting, very often prevail. Many persons, it might possibly be safe to say the majority, look upon an Index as an automatic machine, a contrivance that will grind out forecasts with no reasoning needed at all. Another prevalent view is that forecasting means to prophesy, absolutely, what the situation will be long periods in advance. Business astrology, star gazing, this might be called. Mechanical and impractical conceptions such as these cannot succeed. Future business conditions are not determined in advance, something fated to unroll with mechanical regularity; they never are. Controlled by changing economic forces, most of them old and perhaps well recognized but some new and others at the time unknowable, the business situation *develops*. What its outcome later will be concerns us, decidedly; but the most certain way to predict this is to keep in touch with the situation as it develops.

Practical forecasting, this may be called, or scientific. As has already been pointed out, such forecasting covers:

1. The true status of conditions now, their current position compared with normal.
2. The direction which changes are taking. And the speed they are moving.
3. The situation estimated to develop later on.

Statistical and economic analyses devoted to these matters, which dovetail and mutually support each other, provide the well-informed look forward.

CHAPTER X

ACTION

Looking Ahead, and Preparing, for Business Changes

The man who is forewarned, according to the old saying, is forearmed. Particularly is this true in business, where a manager or an investor must deal with conditions which change. Having a sound view of what changes are occurring, and when, he can prepare to take advantage of them.

"The business man who works by hunch or by guess finds himself over-extended when the crisis comes at the end of prosperity, and he goes to the wall," observes Sam A. Lewisohn, the financier and mining engineer. "But the wise business man, who understands the principle of the business cycle and acts on it, finds himself not only prepared for the period of depression, but ready in those hard and dull times, when prices are low, to expand his facilities, do his new construction work when building is cheap, and contract far in advance at low prices for his stock of goods. He will not only weather the hard times, but he will be prosperous above the general level in good times, because he has prepared for prosperity as he had previously prepared for depression."

A majority of us, it is safe to say, were we to have definite evidence that conditions were to move in a certain direction, could *within our special field* draw up plans for taking advantage of them. Yet for reasons which follow, many persons fail to secure the benefits to which foresight entitle them.

Where Independent Judgment is Led Astray

A knowledge of the facts, or at least a reasoned conviction of what the facts developing are to be, renders service only when acted upon. And when a boom is on and optimism becomes

general, it requires on one's part strong control to draw in, to let slip the orders that one might book, to dispose of stocks and bonds that "everybody" says are going higher. Once liquidation sets in and one's holdings, whether of merchandise or securities, commence to show a loss, greed and stubbornness, and mere hope, conspire to prevent what should be done, cut the loss. Big wholesalers and big stock market operators have learned that what they paid for their holdings and whether present prices show them a profit or a loss, here makes little difference; it is not their position but the *market outlook* which determines what to do.

At the bottom of a decline, when conditions appear so weak but actually are so strong, most men have little confidence in their judgment. They hesitate to lay what really would be sound plans for the future, through fear of being mistaken.

Well-Grounded Confidence

The personal equation, therefore, needs always to be considered, why it tends to reverse the right line of action. The explanation doubtless is that to most persons the future is vague and highly uncertain compared with to-day's tangible events. Shall we disbelieve the orders for goods that are coming in, the crowds of employees passing in and out factory gates, the optimistic talk of our associates? Or, when business is really bad, shall we go against generally held views and facts, such as closed factories and dull trade, which we see? Later conditions *will* be different, but the forces bringing them about are so complex and practical methods for reasoning upon them so little understood, that the majority of men fall back upon what they see to-day.

Methods of forecasting, even the most dependable, cannot fully change this by removing all the uncertainties from business; but they can change it in large measure. They are doing so, for a great many managers and investors, every day.

Good forecasting deals systematically with business conditions, and tendencies. It reduces risks, and gives one greater confidence in his estimates. Confidence means courage to act. And right action inevitably brings its rewards.

